THE JOURNAL OF GAS LIGHTING
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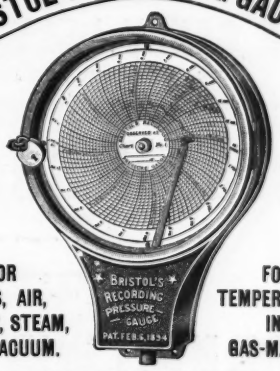

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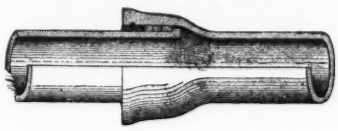

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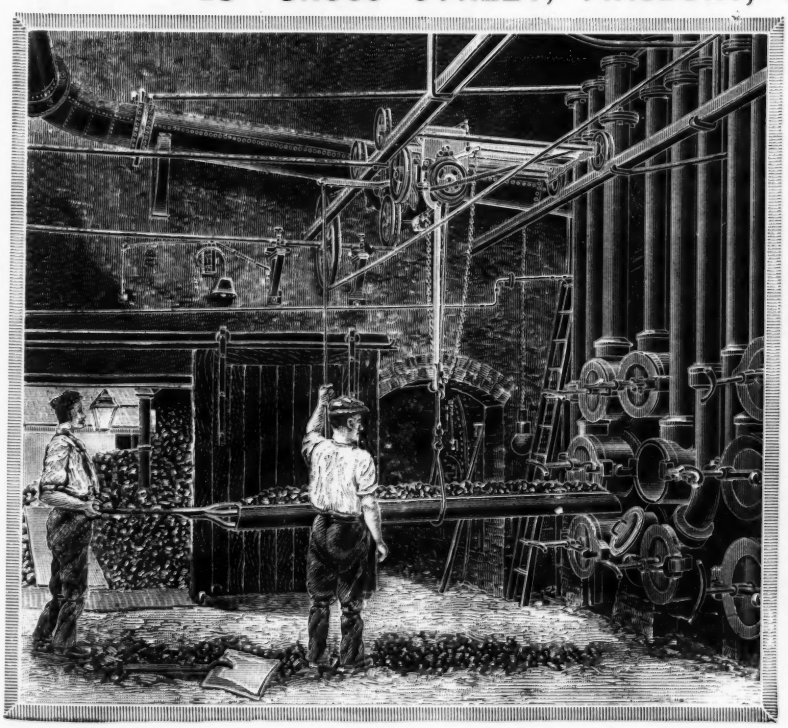

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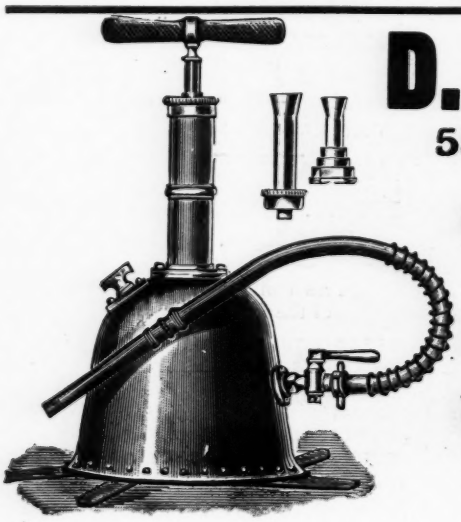

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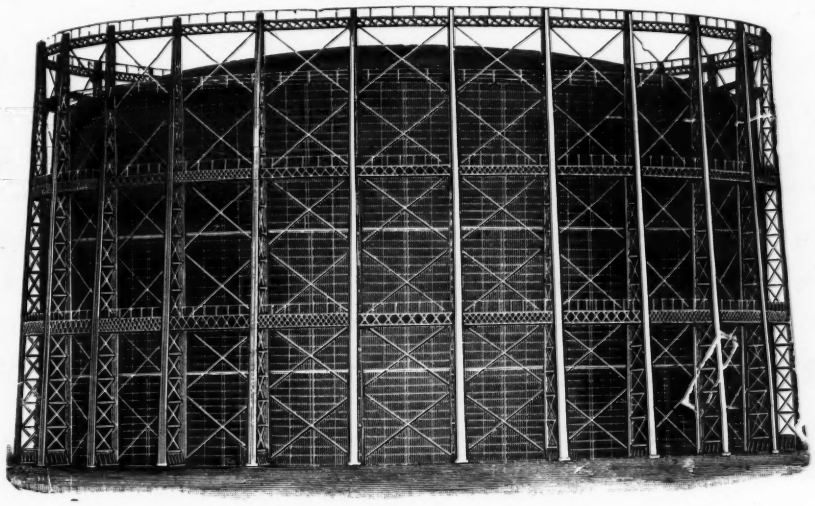

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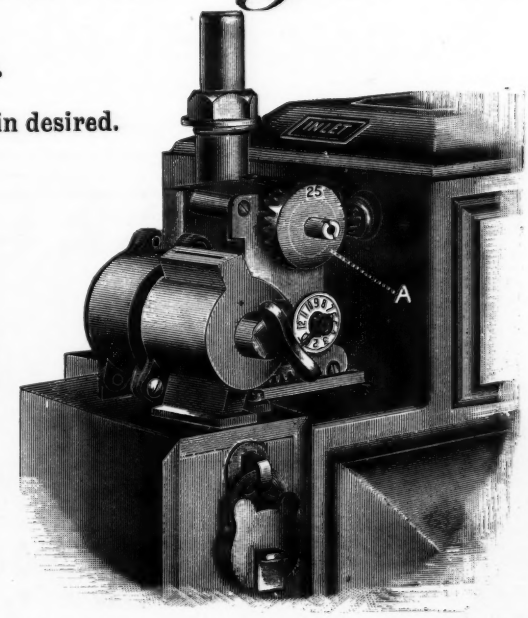

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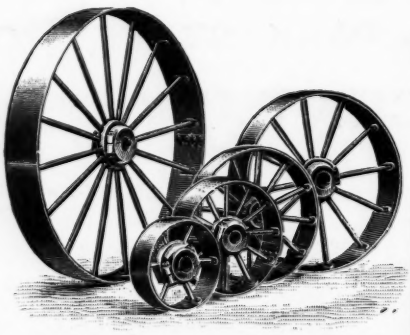

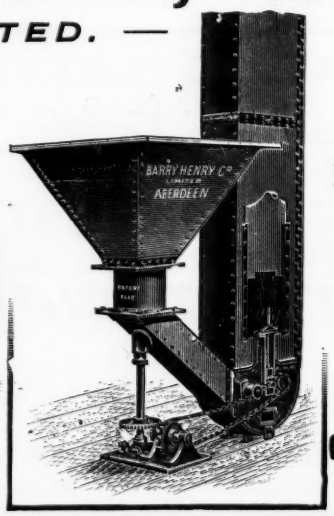

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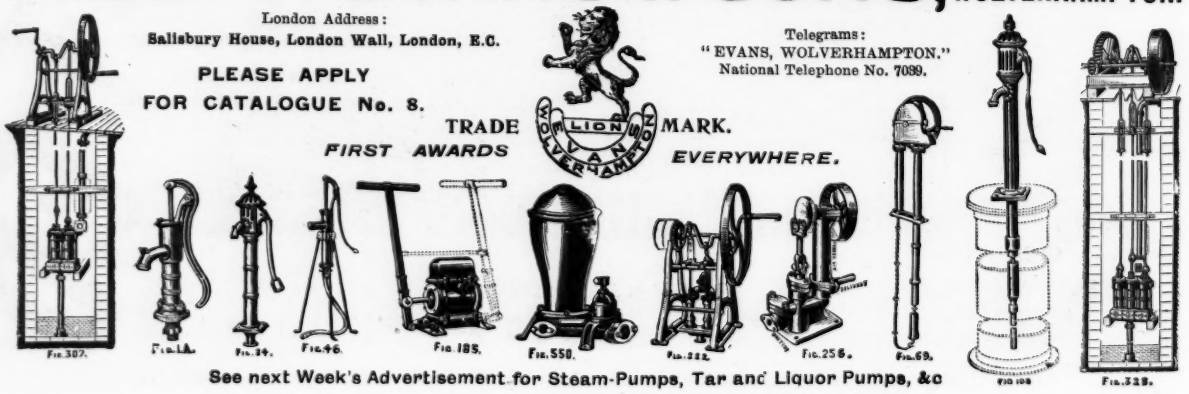

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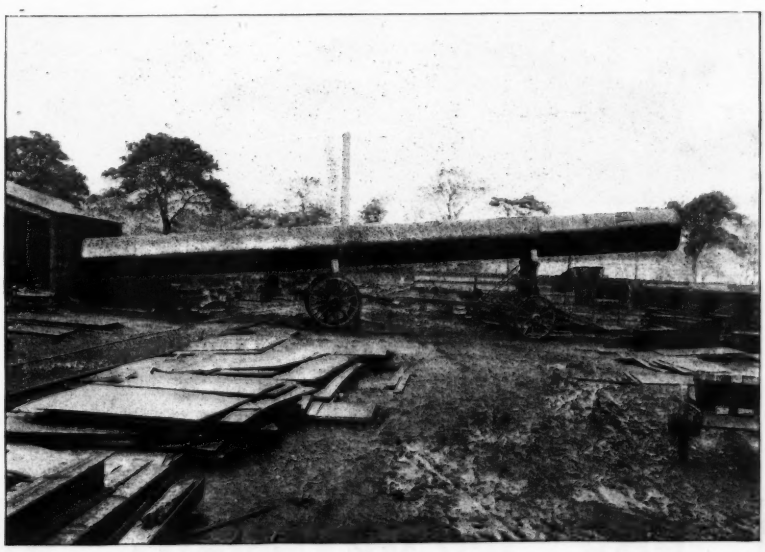

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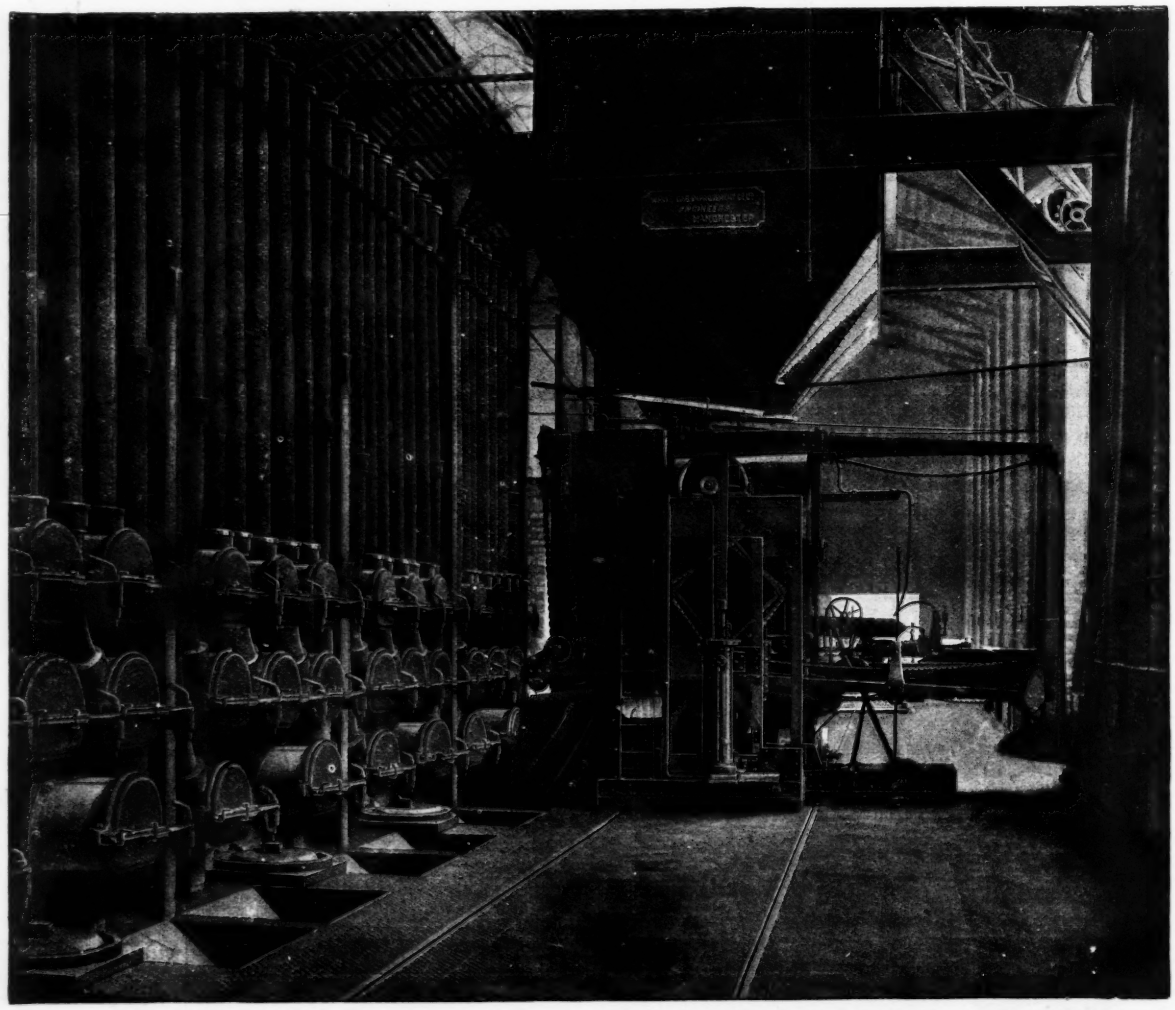

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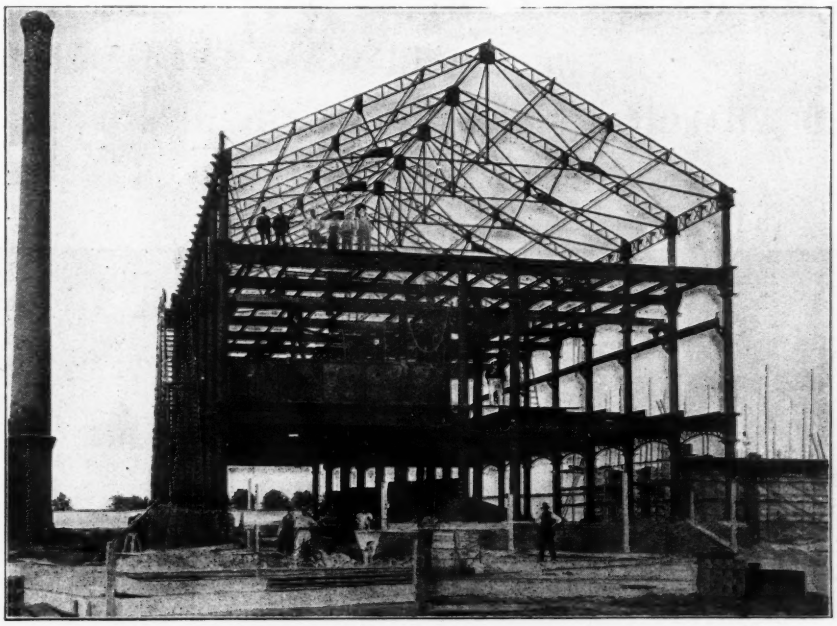

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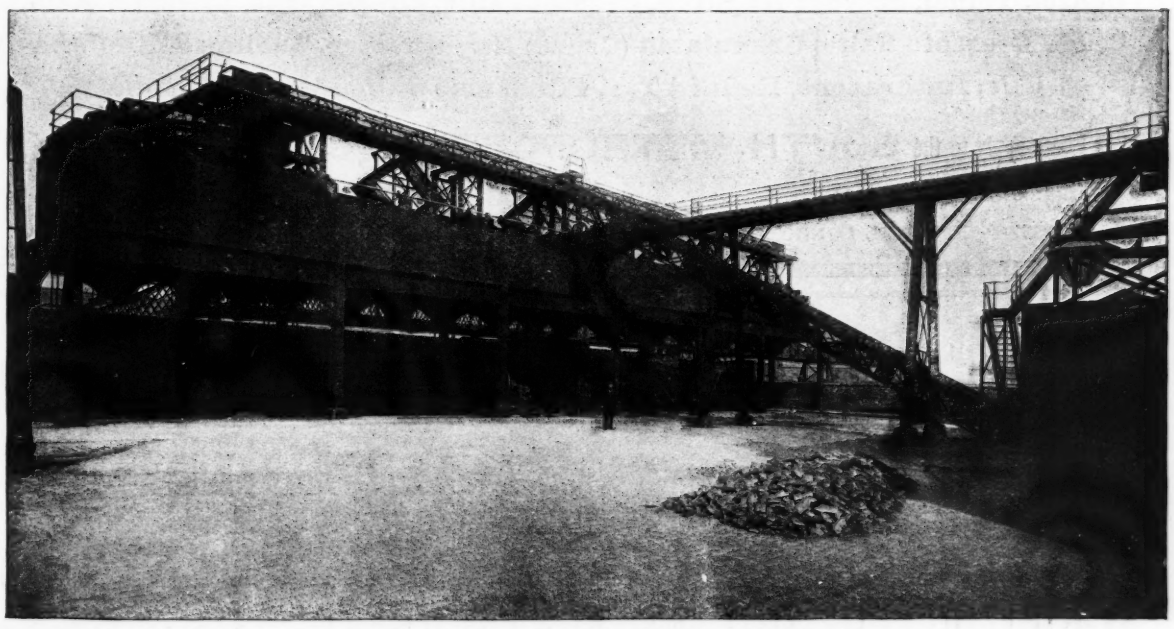

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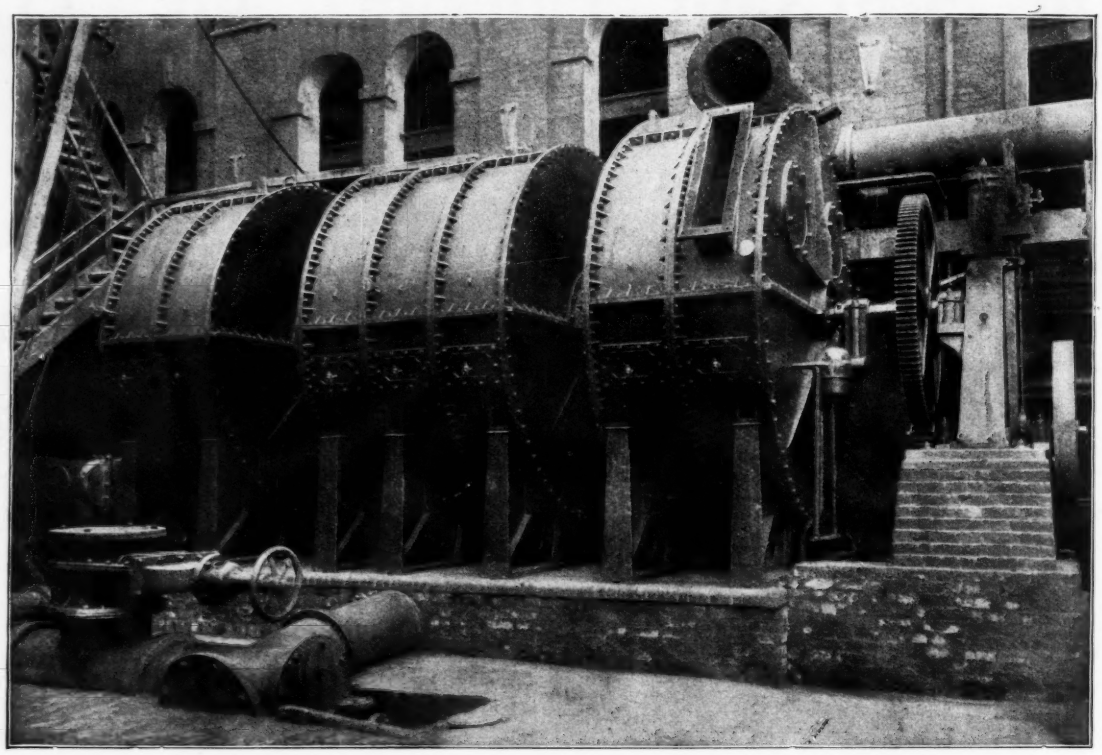

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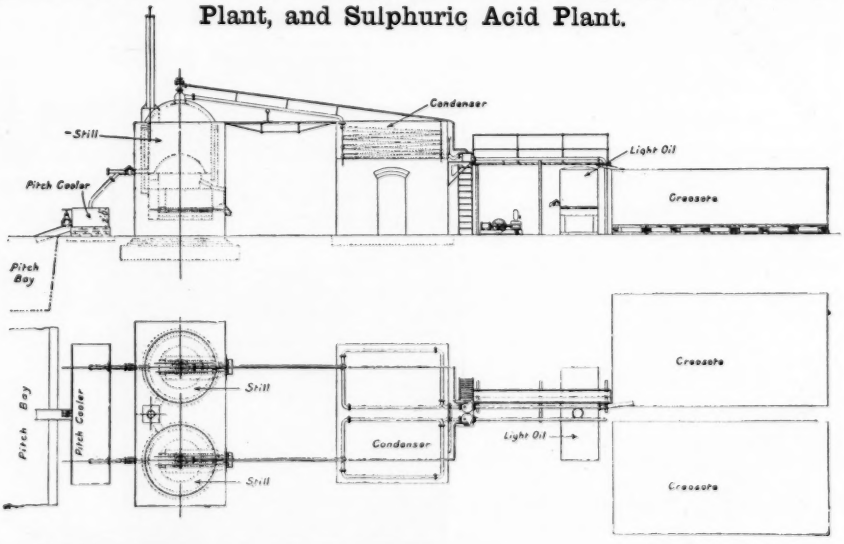

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CONTENTS.

EDITORIAL NOTES.

GAS, &c.—

Parliament and Gas Consumers' Discounts 141
The Fate of the Crystal Palace District Gas Company's Bill 141
A New Weights and Measures Bill . . 141
The Chancellor of the Exchequer and the Coal Duty 142
The Informal Meeting of Scottish Gas Managers 142
The Remuneration of Gas Workers. . . 143
The Affiliation Question—The Supersession of Electricity—The Exeter Rating Appeal—Interesting Points—The Scope of the Workmen's Compensation Act—Municipal Credit—Raising the Wind 143

WATER AFFAIRS—

A New Point as to Back-Dividends . . . 145

ESSAYS AND REVIEWS.

The International Gas Exhibition at Earl's Court 146
Gas Workers and the Workmen's Compensation Act 147
Electric Lighting Memoranda 148
The "Question-Box" System Examined . 149
An Examination of Threlfall's Work on the Flow of Gases in Pipes 150
The Fiddes-Aldridge Simultaneous Discharging-Charger 151
Gas and Water Stock Market 152

TECHNICAL RECORD.

The Eastern Counties Gas Managers' Association and Affiliation 153
Quick Connections 153
Scott-Snell Gas-Lamps on Electric Arc Columns 153
Informal Meeting of Scottish Gas Managers—The Twenty-first Annual Gathering . . 154

COMMUNICATED ARTICLE.

Mr. George Helps on the Settle-Padfield Process—A Reply by Mr. Helps 152

REGISTER OF PATENTS.

Inverted Incandescent Gas-Lamp—Bartlett, J. 160
Coin-Freed Gas-Meters—Anderson, J., and Mackay, J. 160
Street-Lamps—Cuttell, T. L., and the Anti-Vibrator Incandescent Lighting Company . 160
Purification of Gas—Good, R., and Spencer, S. 160
Feeding Appliances for Inclined Retorts—Little, A. J. S. B. 162
Patent Notices 162

CORRESPONDENCE.

Stops—Not Slots 163
"Jäger" *v.* "Standard" Purifier-Grids . . 163

PARLIAMENTARY INTELLIGENCE.

Gleanings from the Committee Rooms . . 163
Progress of Bills 165
Police and Sanitary Committee—Doncaster Corporation Bill. 165

LEGAL INTELLIGENCE.

Supreme Court of Judicature—Court of Appeal—*In re* an Arbitration between the Chelsea Water-Works Company and the Metropolitan Water Board 168
Exeter Quarter Sessions—The Rating of the Exeter Gas-Works 169

MISCELLANEOUS NEWS.

Omagh Gas Arbitration 170
Royal Commission on Coal Supplies—Evidence Bearing upon the Gas Industry . . 173
Utilizing Gas Residuals at Leeds 175
Incandescent Gas Lighting in Marylebone . 175
Electricity *v.* Gas at Hastings 175
Elland Electric Light Extensions 175
Sales of Stocks and Shares 176

MISCELLANEOUS NEWS (*continued*)

Metropolitan Water Board 176
The Tees Valley Water Board 176
Loughborough New Water-Works 176
Notes from Scotland 177
Current Sales of Gas Products 179
Coal Trade Reports 180
Stock and Share List 184

PARAGRAPHS.

The Manchester and District Junior Gas Association—North of England Gas Managers' Association—Extraction of Sulphur from the Residues of Gas Purification—A Royal Recognition of Enterprise—Heating and Ventilating Small Workshops . . . 145
The Cost of Private Bill Legislation . . . 149
Personal. 152
Manchester District Institution of Gas Engineers—The Bacterial Treatment of Sewage 152
Masonic—Increase in the Price of Thorium—Eastern Counties Gas Managers' Association—Gas-Engines Worked with Carburetted Air—The Slip of Pumping-Engines. 159
Liverpool and Water Gas 174
Witham Water Supply 177
Outside Lamps in the City 179
Dorking Gas Company 180
Yorktown and Blackwater Gas Company, Limited—Paris Gas Company—Gas as a Safeguard from Panic—Popularizing Prepayment Installations at Belfast—Reductions in Price—Newcastle and Gateshead Water Bill 181
Leakage from a Birmingham Reservoir—Discoloured Water for Public Baths—New Water Reservoir at Cape Town—Kimberley Water-Works Company, Limited—Suggested Additional Reservoir in the Thames Valley—Charges for Water at Yeovil—Honiton Water Supply 182
Incandescent Gas Lighting for Teddington—Discovery of Water near Skipton . . . 183

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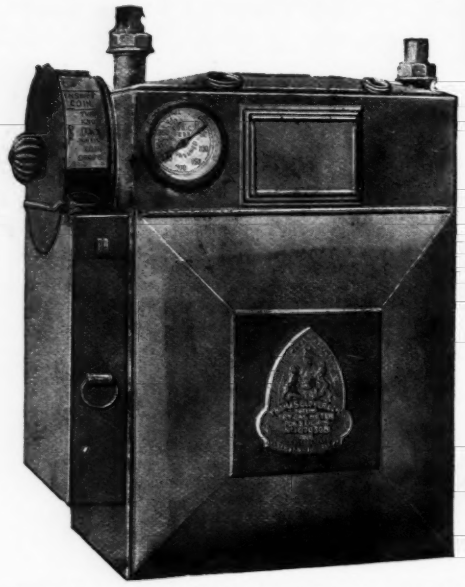

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EDITORIAL NOTES—GAS, &c.

Parliament and Gas Consumers' Discounts.

THE House of Commons Committee on Unopposed Bills had a discussion last Thursday on the principle of gas consumers' discounts, supplementing the decision at which (as recorded in the "JOURNAL" for the 22nd ult.) they arrived in respect to the Bills of the Felixstowe, Gomersal, and Wellington (Somerset) Gas Companies. This was, that "no reason exists for the limitation of the amount of dis- "count to be given by the company in respect of large con- "sumption of gas." In the case of the Appleby Corporation Gas Bill, however, which originated in the House of Lords, Lord Balfour of Burleigh, the Chairman of Committees of the House of Lords, approved the clause in the Bill limiting the discounts allowable to 10 per cent. for prompt payment and 15 per cent. for large consumption. Therefore, this clause appeared in the Bill as it came in due course before the Commons Committee on Unopposed Bills; and Sir Chandos Leigh, the Speaker's Counsel, accordingly drew the Chairman's attention to the circumstance. The limitation of the rate of discount for large consumption is usual; though the amount differs in almost every instance. It seems to have been considered by the Commons Committee that all such limitations might be dispensed with; but the other parliamentary authorities thought differently. Sir Chandos Leigh fought for the former view as long as he could. But he failed to convince Lord Balfour, Mr. J. W. Lowther, and Mr. Gray (the Counsel to Lord Balfour); and accordingly the limitation persists. It will be seen, when all the Acts of the present session come to be reviewed, how much change has been effected in this regard; but in the specific case of Appleby, it stands that the maximum discounts allowable amount to 25 per cent.—made up of the two allowances of 15 and 10 per cent. already specified. Sir Chandos Leigh himself suggested that the stiffness of the authorities in resisting unlimited discretion might be due to the circumstance of the undertakers being a Corporation, and not a Company. He supposed that the Local Government Board would say that unlimited discretion might prove injurious to the ratepayers.

It is difficult to argue either for or against the absolute fairness of any particular rate of consumers' discount, or of any rebate at all, upon abstract considerations. On the face of the question, one might be disposed to think that a total allowance of 25 per cent. ought to satisfy anybody. It is probably as much as is ever allowed, in the British gas industry. Such matters are essentially for local treatment, however; and it is certain that commercial opinion is all in favour of the greatest degree of liberty in this respect. All that we are specially concerned to point out in the present connection is that the parliamentary authorities who were afraid lest excessive discounts should affect the rates, and create inequality between the consumers of gas, were carrying out the spirit of the Bermondsey clause, perhaps unknowingly. If Mr. Boyce is to come from the Local Government Board, as Sir Chandos Leigh pictured, and tell a Committee of Parliament that he "must take care "of the ratepayers, because, if you allow unlimited discre- "tion, it may affect the rates," this attitude of the Department must *a fortiori* be displayed with regard to the freedom to grant discounts up to 75 per cent. in favour of particular consumers of electricity. If this principle guides the action of the Department and the authorities of Parliament throughout, there will be nothing to complain of; but it appears that the Local Government Board and the Board of Trade are not of one mind in this matter. This is to speak without book; but we do not recall any specific published statement as to the way in which the Local Government Board regard the Bermondsey clause. If Sir Chandos Leigh's idea is really the correct one, the Local Government Board must approve both of the original Bermondsey clause and of any extension of it which aims at securing air treatment of all classes of consumers.

The Fate of the Crystal Palace District Gas Company's Bill.

THE statements made when the Bill of the Crystal Palace District Gas Company was mentioned in the House of Commons before Easter presaged ill-fortune for the measure this session. It will be remembered that objection was taken to the Bill proceeding in view of certain of its matters —gas testing and sulphur purification—being under the consideration of the Departmental Committee of the Board of Trade. The second reading of the Bill was therefore postponed until April 12; and a distinct declaration was made that, if by then the Committee had not reported, an instruction should be made to the Select Committee to whom the Bill was allocated to eliminate any clauses that came within the purview of the reference to the Departmental Committee. As it was improbable that the latter would be in a position to report before the Bill could reach the Committee stage, it appeared clear that there were only two possible courses open to the Directors of the Company—either to take the extreme measure of dropping the Bill altogether this session, or else to themselves strike out the clauses relating to lime purification, illuminating power, and testing.

The Directors have chosen the second alternative. They have undertaken to omit clauses 2 and 3, referring to illuminating power, testing, and the free supply to the consumers of suitable burners. Under these circumstances, no instruction was moved when the Bill came up for second reading last Tuesday. In addition, clause 9 is to be withdrawn. This is, in effect, the Bermondsey clause; and as yet there is no precedent for such a clause (though it is to be hoped there soon will be one) excepting when an electricity supply measure is before Parliament. However, the remaining clauses of the Bill are worth having; and the Directors have acted wisely in determining not to throw them over with those that they were compelled to resign by the force of circumstances. The provisions are saved relating to the half-yearly sliding-scale arrangements, the sale of stock direct to consumers, workmen directors, employee shareholders and depositors under the co-partnership system being empowered to nominate successors, and the change of the name of the Company to "The South Suburban Gas "Company."

There is every reason to believe that now the Bill will proceed unopposed; all the petitioners against having either withdrawn, or have agreed to do so. The ignorance and prejudice of the Local Authorities over the Company's attempts to bring about a state of things in connection with their supply to meet present-day conditions of use are responsible for more than meets the eyes of their constituents. Over last year's measure and the present one—largely through their foolish hostility—a bill of costs has been run up of something like £6000 (perhaps more); and this sum falls upon the unconscious consumers.

A New Weights and Measures Bill.

IN the House of Commons on Friday, a New Weights and Measures Bill was read a second time, and got itself happily ensconced afterwards under the wing of the Standing Committee on Law. This procedure is just now the only way in which a private member's Bill can become an Act; and in the present case there appears to be a strong feeling in the House that the measure is a good one, and ought to be passed without further delay. The Bill as drafted contains a section designed to bring in the metric system, as it were incidentally; but this is to be withdrawn in Committee. The decision of the promoters to lighten the Bill of this extraneous scheme met with general approval, and was the price paid for the consent of the Government to its further progress. It is very striking how little success attends the endeavours of the partisans of the metric system to gain their ends, either directly or by a side-wind. If the compulsory introduction of the metric system for general purposes is proposed, the objection is at once raised that this is

legislating on abstract principles, and is therefore contrary to the national spirit. If, on the other hand, as in the present instance, the proposal is to effect an instalment of the change, by dealing with such a detail as the systems of troy weight and apothecaries' weight, it is immediately protested that to upset a trade for no countervailing advantage would be a wanton piece of pedantry. The latter argument prevailed with the House of Commons, and the cause of the metric system enthusiasts accordingly suffered a heavy blow and great discouragement. Apart from "this excrescence," as the President of the Board of Trade called the metric proposal, the Bill is the fruit of a conference held some time ago between inspectors of weights and measures and makers of weighing-machines. There are incompatibilities in the existing law and practice of weights and measures which the Bill offers a fair prospect of removing. In the progress of the decentralizing of domestic administration which has been deliberately adopted by the nation, the execution of the law relating to weights and measures was entrusted to local authorities; and in the course of time different usages have grown up, until the ultimate result is chaos in a mild form. Something is therefore necessary to be done to restore uniformity. It is not right that such shortcomings of practice as those mentioned by Sir J. Dimsdale should exist where "the scale of the coal merchant is put under "the supervision of the inspector, while the coke-scale is "exempt." The stamping of weighing-machines occasions a grievance, because it appears that in some places stamps other than local one are not recognized. Some ingenious local authorities also allow rebates upon the stamping fees, which has the effect of giving a preference to local makers. It is not stated whether or not these are Free Trade constituencies. It is felt, moreover, that there is room and need for a lower class of officials under the Acts, to work under the inspectors. They would be employed on verification duty only, and would not have anything to do with the stamping of weights and measures. Another provision of the Bill is for the revision of weights and measures and weighing instruments. This matter will require careful examination, if commerce is not to be saddled with a new and onerous burden.

The Chancellor of the Exchequer and the Coal Duty.

The questions of the policy and incidence of the export duty on coal were considerably elucidated during the past week, by parliamentary and departmental proceedings in this regard. Mr. Plummer asked the Chancellor of the Exchequer to state the net proceeds of the duty collected at the shipping ports of the United Kingdom for the three years 1901-3, and also the quantity exported without paying duty, on the ground that its value did not exceed 6s. per ton. The answer fills several pages of the Votes for the 12th inst., and incidentally fulfils the purpose of a Parliamentary Paper in exhibiting the localization of the export coal trade of the country, and its recent growth under the conditions created by the duty. The total amount of coal tax paid, after deductions in respect of old contracts, rose from about £1,000,000 in 1901 to £2,303,411 last year. At the same time, the quantity of exported coal on which the tax was remitted increased enormously—from 436,849 tons to close upon 5 million tons. On the face of these totals, therefore, it is possible to argue that the tax is both a productive and a rapidly augmenting impost, from the point of view of revenue; while it appears to encourage great activity in the foreign distribution of the cheapest class of British coal. The ports that collect most money, and also do the largest and most expansive trade in cheap coals, are those of the North and East coasts of England and South Wales. In face of these returns, a deputation of coalowners, exporters, shipowners, and colliers waited on the Chancellor of the Exchequer last Tuesday to ask for a repeal of the duty. It was a bold enterprise; but the leaders of the deputation were equal to the occasion—Mr. Clifford J. Cory, of Cardiff, describing the effect of the tax on the coal industry as "disastrous." Seeing that the proceeds of the duty from Cardiff increased in the three years from £335,146 to £716,115, and the exportation of the lower-class coal rose from 25,899 tons to 1,504,591 tons, the complaint seems to lack justification. Mr. R. O. Lamb, speaking on behalf of the Northumberland Coalowners' Association, declared that the result of the tax had been severely felt by coalowners and miners alike. Collieries had had to be shut down or worked on short time; thereby throwing many men out of work. Judging by the figures, these victims of the tax might have found work at the ports, where business has been brisk.

The Chancellor of the Exchequer, in the circumstances, had no great difficulty in meeting the request of the deputation by references to the recorded facts. It transpired from his reply that the Minister had been reluctant to receive a deputation on this subject at the present time, when the Royal Commission which is considering the whole question of the national coal supply must be on the eve of reporting. As matters have turned out, those who forced the deputation upon him must be rather sorry they did so. For while the Government and people of the United Kingdom are, and it is to be hoped ever will be, ready and willing at all times to lend an ear to every well-founded grievance, whether of a fiscal or any other nature, the British are not to be "gammoned"—there is no other term for it—by trumped-up trade protests against particular taxes, which will not bear independent examination. The export duty on high-class British coal commends itself to the good sense of the community, who are only dubious as to the amount. It is highly probable that a doubling of the duty on the best coals, to make up for the remission on the lowest priced coals, would be popular at the present juncture, when everybody is dreading increased general taxation. It was for the deputation to reconcile the complaint that their trade is hard hit by the existing small duty, with the facts that shipments are greater than ever, and are growing fast. It is no wonder that they failed. The tale of distress has no bottom to it; and it is not shrewd on the part of the followers of the trade that they should persist in telling it to an unsympathetic public, fortified in the attitude of incredulity by the facts adduced by the Chancellor of the Exchequer.

The Informal Meeting of Scottish Gas Managers.

Of the informal meeting of Scottish Gas Managers, held at Glasgow last Wednesday, it is impossible to say other than that it was a great success. This was only what was to be expected, when it is taken into account that it was the twenty-first anniversary of the first of these meetings, and that the President for the year was Mr. James M'Gilchrist, of Dumbarton, than whom there is not to be found a more capable organizer. Mr. M'Gilchrist was the founder of the meeting; and he is to be congratulated most heartily upon the success which has attended his happy idea of gathering his brethren together in the spring, to talk of their winter's work and of their requirements for the next lighting season. At the large assemblage over which he presided last week, he must have felt a glow of triumph; while contemplating the proceedings, the high order of the debate can only lead to reflections in his mind of the most gratifying nature.

His address was a long one, covering a wide field in the realm of gas supply, as if he had resolved that discussion should not be starved for want of materials to quarry in. The tone, it will not fail to be observed, was general. As he himself said, with the exception of the method which he adopts for protecting his condensers during abnormally cold weather, there was nothing personal in it. Following upon this condition, the remarks in the course of the discussion did not take so much the line of reminiscence as is frequently the case at gatherings of gas managers—with, there can be little doubt, great advantage to the listeners. The advice to form suspense accounts for the extension or renewal of plant was one of the leading features of the Presidential Address. It received no support, but was, on the contrary, what may be termed talked out, by Mr. Yuill and Mr. Vass. The convenience of having a fund to dip into whenever occasion arose, is undeniable. But it would most probably be found to be too convenient; and notwithstanding the remark of the President as to the objects for which it was created being stated, the suspicion will hover over the President's proposal, that such a fund would become the happy hunting-ground of faddists, and that pretexts would be found for frittering away the money upon objects not always necessary or advisable. After all, the equipment of a works by means of money in hand is not very much different from doing the same thing by borrowing. In the one case, the money has to be provided out of profits before the work is undertaken; in the other, it has to be provided out of profits after the work has been completed. And on a balance of considerations, the equity would seem to lie with the latter plan, because the plant provided would then be employed to pay for itself.

Mr. M'Gilchrist has all along been one of the most staunch supporters of the policy of supplying high-grade gas, and in this he had for long with him the almost unanimous voice of the gas managers of Scotland. It is very different now—the opinion being practically all the other way; and even he himself confesses that his views on the subject are moderating, in view of the advance of incandescent gas lighting. The high price of the better classes of coal has had as much to do with the conversion of Scotsmen to low-grade gas as has incandescent gas lighting; the latter being little more than the means by which the object is to be accomplished, or, at all events, the medium of reconciliation to a state of matters which had formerly been looked upon with some amount of repugnance.

The "At Home" which was given by Mr. and Mrs. M'Gilchrist in the evening was a happy termination to a day which had been marked throughout by a spirit of great cordiality and good-fellowship.

The Remuneration of Gas Workers.

It is to be hoped that one of the papers for reading at the ensuing meeting of the Institution of Gas Engineers will have for its subject the methods of remunerating labour in gas-works. This is not to say that the subject has not been discussed at previous meetings, or that the known example of Sir George Livesey's work bulks less than it did on the gas manager's horizon. But there are more ways than one of cooking any kind of food; and such a problem as the proper remuneration of gas workers has several possible solutions. For instance—not as an example in itself, but merely by way of illustrating the question—the announcement made not long ago of the adoption by the Admiralty of the premium system for the payment of the dockyard workers serves as a suitable peg on which to hang an instructive paper, because the conditions of employment in the Government Dockyards are in many essentials similar to those prevailing in gas-works, especially when municipalized. Profit-sharing obviously presumes the making of profits; and where there is nothing of this nature attaching to the employment, as in national and municipal service, no such system can be logically applied. Apart from this consideration, however, the problem of how to make it worth the individual workman's while to keep doing his level-best, is of hoary antiquity and of moss-grown difficulty. Piecework is the obvious expedient for inducing the individual workman to earn his pay; but the shortcomings of the system are notorious, and need not be detailed. Some years ago there arose a modified form of payment by the piece, called task-work, which also soon found its level.

The newest proposal of the kind is styled the premium system, which has been mentioned several times in the "Journal," and exists in different modifications of the main principle, which is that of allowing the workman the full value of the time he may be able to save in doing a set job. The method of measuring the saving is simple enough in some examples, but must be difficult in others. One cannot see, moreover, why other beneficial results, such as material economized, output increased, or plant taken greater care of, should not be treated in the same way. The starting-point of the system may be defined with reference to the case of a mechanic, who, being allowed 48 hours to complete a job which he succeeds in doing in 36 hours, is paid as premium the amount of his wages for the time saved, in addition to his regular wages for the time allotted. This is the principle. Of course, its practical value wholly depends upon the way in which it is applied. The accuracy and fairness of the classification are the keys to success. It will be perceived that the gain of the individual workman is permitted to be larger under the premium system than it can be under any profit-sharing scheme, and it is not participated.

There is something to be said on both sides on this matter. Nobody who is wise wishes to see the workman over-taxed. On the other hand, he must be offered a sufficient inducement to do his level-best, and keep doing it. The system ought to check time-losing, which is such a waste of money in the aggregate. In the circular notifying the trial introduction of the system, the Secretary of the Admiralty remarks that it is hoped that it will lead "to the workmen "taking an increased interest in their work, machines, tools, "and equipment generally, and to keenness on their part "in pointing out to their officers where improvements may "be made and time saved, resulting in better methods of "work." This is the proper spirit in which to regard all such experiments. The industrial world has had enough of the eight-hour day and other movements of a one-sided nature; and the hour has already struck for the employer to take his turn at the task of constructive improvement.

The Affiliation Question.

Last Tuesday morning, the Secretaries of the various District Associations received an official communication from the Institution of Gas Engineers on the subject of affiliation, covering a copy of the recommendations of the Special Committee as endorsed by the Council, and published on p. 73 of last week's issue. The Committee of each Association are asked by the Council to lay the particulars before their members at the earliest opportunity, with the view of ascertaining whether the Association are willing to become affiliated with the Institution under the present arrangements. It will be observed that, in the official copy of the recommendations passed, no reference is made to the little extension that will have to be effected in the Articles of Association of the Institution to embrace the projected affiliation. The omission does not mean that it is not going to be made. It is imperative; and the reply to an inquiry of the Hon. Secretary (Mr. J. W. Helps) is that the Council have sanctioned the taking of the necessary steps in the matter. Of course, the alteration will have to be brought formally before the members of the Institution. The Articles referring to the number of the members of Council will also have to undergo a slight alteration, in order to include the addition which the members delegated by the affiliated Associations will make. It is of interest to learn, as an indication of the unanimous feeling of the Council on the subject, that they adopted the report of the Special Committee without delay, believing that the recommendations supplied the best way of surmounting the little difficulties that had been found to exist. On every hand, the feeling of the Council was that nothing on their part should be allowed to stand in the way of bringing about as fully as possible the amalgamation of the strength and influence of the whole of the organizations of the British gas profession under, as it were, one flag.

The Supersession of Electricity.

There falls this week to be recorded yet another case—small, it must be confessed, though none the less significant for that—of the displacement of electricity by incandescent gas lighting. On this occasion it is arc lights that have suffered defeat; and once more it is in a town where both illuminants are supplied by the Local Authority. This latter consideration must in any event be an important one; for it places each light on exactly the same footing. At Keighley, however, it is rendered additionally so, by the fact that the electricity undertaking is already a heavy burden on the rates (which makes it only fair to assume that the councillors would do anything in reason to assist it in the somewhat uphill task of justifying its existence as a branch of municipal operations), while the gas-works are producing large profits. One of the main streets of the town has hitherto been lighted by twelve arc lamps fixed on pillars in the centre of the road, at a cost of £240 a year; but the Highways Committee have now recommended—and the Town Council, on the casting vote of the Mayor, have agreed—that these pillars should be removed, and the arc lights replaced by twenty-one 300-candle power incandescent gas-lamps, which will cost £96 per annum. There will thus be a saving of nearly two-thirds of the present outlay—or no less than £144 on the lighting of this one street alone—while there is not the slightest reason to suppose that the illumination will be other than improved. It is said that the decision has given rise to much comment in the town; and we should imagine that one of the most frequently asked questions is: "How was it ever possible for such an extravagant system of arc lighting to have been adopted?" The unfortunate part of the matter is, of course, that the action of the Council forms a very poor advertisement for the electricity which they are so anxious to sell to the ratepayers, who will be able to derive from the affair an only too correct idea of the expense of the system as compared with gas. But even this consideration is insufficient to counterbalance the advantages in smaller cost of light, as well as in longer life of the road owing to the distribution of the traffic over a wider area, anticipated from the new arrangement.

The Exeter Rating Appeal.

There are some interesting features about the appeal of the Exeter Gas Company against the raising of their assessment, which engaged the close attention of the Recorder (Mr. J. A. Foote, K.C.) at the Exeter Assizes on Monday and Tuesday last week. The increase of the assessment is a heavy one, and one which the Company could not calmly agree to. Originally, it stood at £5486 10s.; and the addition made to this was something like £3000. To be exact, the assessment was raised to no less than £8348 10s.; but this the Committee subsequently reduced to £7811 10s. The difference in views was not alone as between the Company and the Committee. The parishes could not agree —their differences arising from the fact that the whole of the works are situated in the parish of St. Thomas, where little or no earning power is attached to the mains; while nearly the whole of the earning power of the mains is located in Exeter. This resulted in what may be described as a triangular fight between the Company, St. Thomas, and Exeter City. St. Thomas—having the whole of the works in their district—claimed 5 per cent. on the structural value of the buildings, which was the lion's share of the rateable value, while the City of Exeter were not content with the remainder. In consequence of the position which this all-round disagreement created, Counsel and expert witnesses were plentiful. Messrs. William Eve and Son, Messrs. W. A. Valon and Son, and Messrs. Corbet Woodall and Son were retained to assist the Company; Counsel being Mr. Boyle, K.C., and Mr. J. A. Hawke. The City were advised by Messrs. Hedley, Mason, and Hedley, Mr. Charles Hunt, and Mr. C. F. Jones, with, as Counsel, Mr. Ryde, K.C., and Mr. Randolph. The parish of St. Thomas had Messrs. Ryde and Sons, Mr. Dinwiddy, and Mr. H. E. Jones; Counsel being Mr. Macmorran, K.C., Mr. Charles, and Mr. Dummett.

Interesting Points.

The value of the whole undertaking was placed by Mr. Eve at £4463; Mr. W. A. M'Intosh Valon found the rateable value to be £4271; and Mr. Corbet Woodall's figure was in the same neighbourhood. The Company's case was that the whole of the valuation of the concern did not allow of the usual 5 per cent. being allocated to the structural portion in St. Thomas; hence that the rateable value should be proportionately distributed, and that the structural portion should only come in for its fair share, which the Company's witnesses gave as 3½ per cent. But, as already stated, St. Thomas Parish were not content with this, and claimed 5 per cent. on the structural value, which would only leave a very small share of the rateable value for other parishes. Mr. Mason, for the City, introduced a novel mode of valuation. He took the total dividends paid by the Company in the year 1902, and apportioned for tenant's capital one-third, leaving the remaining two-thirds as the rateable value of the whole undertaking. This mode of valuation was severely criticized, and did not seem to make much impression on the Court. One of the interesting points in connection with the assessment, which introduced variations from the ordinary condition of things, was that the Company only collect their accounts half yearly. This, of course, increased the amount of capital the tenant would require for carrying on the undertaking; but at the same time it reduced the cost for collection, inspection, and other matters of that kind. The evidence of Mr. Valon was that, if the collection had been quarterly, the difference in the tenant's capital would be about £4000, interest on which would amount to £700; but as a set-off to this there should be deducted £580, which would be the extra cost to the Company in collecting their accounts four times a year, instead of twice. In his evidence for the Assessment Committee, Mr. H. E. Jones made his valuation of the concern as a whole £4900. He admitted, however, that some adjustment would have to be made with regard to the claim of the St. Thomas district, as against the full amount of 5 per cent. which they were seeking. The whole of the evidence was completed on Tuesday afternoon. The decision was adjourned until the next sessions; but, in the interim, speeches of Counsel are to be delivered at Mr. Foote's chambers in London.

The Scope of the Workmen's Compensation Act.

A case was before the Court of Appeal last week which is of some interest as showing how extensive is the ground covered by the Workmen's Compensation Act, as well as because of the peculiar character of the decision arrived at. The action in question—that of *Andrew v. The Failsworth Industrial Society, Limited*—arose out of the death of a bricklayer who, while at work on a scaffold about 23 feet from the ground, was killed by a flash of lightning. The defence was that the accident was the result of an act of God, and did not arise out of the man's employment; but this was unsuccessful, as it was proved that, by reason of his position high up on the building, the man was exposed to more than the ordinary risk which everyone incurs through a thunderstorm. Commenting on this decision, a barrister writing in the "Financial Times," says it is interesting to speculate upon what would have been the result if the workman had been within the zone of comparative safety (a space covered by a line drawn at an angle of 45° from the highest point of the erection to the earth) when he was struck, as surely no distinction could have been made that it would have been the result of an act of God if he had been struck within the zone, and not so as he was outside it. But for his employment, he would not have been upon the building at all. Suppose, again, a man were killed by lightning while working in the ordinary way inside his employer's factory; but for his employment, he would not have been at the spot where the discharge occurred. The point is, says the writer, that a flash of lightning cannot be more or less an act of God under whatever circumstances it occurs; it may be more or less unusual, but that is all. He adds that the present legal decision emphasizes the complete recasting of the legal notions on the subject which formerly obtained. It also seems clearly to lead to the conclusion that henceforth employers will have to add at least one more to the already long list of circumstances to which the Workmen's Compensation Act applies.

Municipal Credit.

The much advertised issue of £5,000,000 of stock by the London County Council last week, has once more drawn attention to the present condition of municipal finance generally; and it is only to be expected that the admitted success which attended the loan—it is reported to have been subscribed many times over—will induce other authorities who are urgently in need of money to try their luck in the same way. But, after all, the County Council have achieved their success by a very simple method, and one which, if carried far enough, would be bound under any circumstances to prove efficacious. That is to say, they fixed the price at such a figure as would be fairly certain to tempt capitalists and investors; and a glance at this figure is sufficient to rid the successful issue of some at any rate of its glamour. A 3 per cent. stock secured on the rates of London, offered at 10 per cent. discount, is a very different story from that which has been so often urged in favour of municipal trading undertakings—*i.e.*, that local authorities could borrow money at an exceptionally cheap rate. No doubt, the price at which the loan was placed was the highest that could safely be asked for it; and therefore it may fairly be taken as indicating the altered circumstances with which municipalities are now called upon to cope with regard to their financial affairs. In this connection, the "London Argus" published a few days ago a list of towns which are now seeking to raise loans in small amounts, and at varying interest, upon the security of their rates. The interest ranges from 3 to 4 per cent.; and in most cases large or smalls sums of money are gladly accepted on the condition that they are repayable at six months' notice—the minimum amount received in any of the instances quoted being £50. When these offers fail to attract any further supplies of money, we may see the interest raised to 4½ or 5 per cent., and big loans issued at an even heavier discount than the present London one. Money is evidently urgently needed by a great many of the local authorities; but it is to be hoped that they will, as far as possible, restrict their requirements, and not build too much upon last week's achievement of the County Council.

Raising the Wind.

It is reported that the Sheffield Watch Committee have hit upon a method of making money, which we trust will not be adopted in other quarters. The Committee are said to have granted, by way of experiment, permission for "advertising escutcheons" to be suspended from the public lamp-posts. If the experiment proves successful—that is, presumably, if the idea of advertising in this way "catches on"—there is no telling what

may be the limits of this brilliant idea. Certainly there is no reason whatever why it should stop at lamp standards, though even if it were confined to these the suggestion is one that it is impossible to contemplate with anything approaching equanimity. Sheffield is not included in the list of towns just referred to which are anxious to receive small (or large) sums for short periods; but surely the city must be badly in need of money to hit upon such an expedient as this. Several uses for lamp-posts beyond the one for which they were originally intended have already been hinted at—one part of Manchester in which such ornaments are unusually plentiful has been termed the "drunkards' paradise," while elsewhere it has been suggested that arc lamp standards would be eminently suitable for hanging councillors on. But Sheffield has apparently succeeded in heaping on them an additional indignity. Perhaps, however, there is some mistake, and the intentions of the City Fathers are being misjudged; or, if not, possibly the experiment may turn out a failure. At any rate, we must hope for the best.

The Manchester and District Junior Gas Association hold a meeting next Saturday, at Ingham's Hotel, Manchester, when a paper on "Refractory Material" will be read by Mr. E. L. Rhead, Lecturer in Metallurgy, &c., at the School of Technology.

North of England Gas Managers' Association.—At the forthcoming meeting of this Association, which has been fixed for the 30th inst., there will, in addition to the discussion on the paper read by Mr. A. C. Hovey last October, be a lecture by Mr. Jacques Abady on "Photometry." The question of affiliation will also come up for consideration on the Institution Council's proposals. The dinner will, as usual, take place at the conclusion of the proceedings.

Extraction of Sulphur from the Residues of Gas Purification.—MM. Vaton and Zuaznavar have patented in France apparatus for extracting sulphur from the residues of gas purification and from poor ores. The residues or other materials are dried by exposure to air and to carbon dioxide, and are then heated in retorts, to which series of condensers are so connected that only vapours (not molten sulphur) may reach them. The first in order of the condensing chambers is of such dimensions as to maintain a temperature greater than 150° C. and less than 440° C., so that only pure sulphur is condensed therein.

A Royal Recognition of Enterprise.—Only a few weeks ago an account was given in the "JOURNAL" of the new engineering works which Messrs. Graham, Morton, and Co., Limited, have erected at Leeds. The building of these works was, as then stated, a notable monument to enterprise, skill, and expedition. They are, too, partly the result of the impression made on Mr. Maurice Graham, the head of the firm, by the famous "wake-up" speech of H.R.H. the Prince of Wales; and, in consequence of this, at the close of last month Mr. Graham asked His Royal Highness to accept a souvenir illustrating the work. This the Prince of Wales has had pleasure in doing; as is seen by the acknowledgment addressed to Mr. Graham from Marlborough House by Sir Arthur Bigge: "The Prince of Wales desires me to thank you for the copy of the souvenir—illustrating what has been done by your firm in the design and construction of new engineering works, built on the most modern and up-to-date principles—which you have been good enough to send for His Royal Highness' acceptance. His Royal Highness has read your letter with much interest, and desires me to congratulate you in his name on the great rapidity with which your undertaking was carried out."

Heating and Ventilating Small Workshops.—This was the subject of a paper read at the meeting of the Junior Institution of Engineers (of which Mr. Samuel Cutler, jun., is Chairman) on the 8th inst., by Mr. Kenneth Gray. In the course of it he stated that the warming of shops could be best secured by direct heating—*i.e.*, by putting the radiating surface inside the various shops. Where appearance was not of such importance as economy of space, this could be effectively done by fixing hot-water or steam pipes above the head level. The only difference this would make in warming a building was that it took rather longer to raise the temperature than when the pipes were fixed on the floor level; but as soon as the required temperature was reached it could be just as easily maintained. Rules and tables for calculating the required amount of radiating surface were given and fully explained; particular attention being called to the influence the material of which a building is constructed, and the extent to which it is exposed to the cold winds, have upon the amount of surface necessary. In the discussion which followed, much interest was shown in the relative merits of mechanical and natural ventilation and the "Plenum" and "Extractum" systems. The author, in his reply, discussed the various questions raised, and recommended some mechanical means of ensuring a change of air in the case of crowded assemblies. With regard to the two systems named, he said both had merits, and good work could be done with them. Everything depended upon the design and erection of the apparatus.

WATER AFFAIRS.

A New Point as to Back-Dividends.

THE Chelsea Water Company have been less fortunate than the New River Company in their appeal to a legal tribunal for assistance in determining which of the two amounts named by the Arbitrators under the Metropolis Water Act, 1902, should be paid to them for their undertaking. The difficulty arose on the claim made by the Company to be entitled to pay a dividend of 10 per cent. upon the whole of their capital; and the question the Court had to decide was what is the "prescribed" rate of dividend to which a company is entitled when part of the capital is preference stock bearing a fixed rate. The Company have £782,322 of ordinary stock, £150,000 of 5 per cent. and £160,000 of 4½ per cent. preference stock, and £643 of 4½ per cent. convertible preference stock; making a total of £1,092,965. Upon the whole of this they claimed to be entitled to pay a maximum dividend of 10 per cent. per annum; and assuming that this claim could be sustained, the Arbitrators awarded them £3,418,000. They, however, considered that the Company were restricted to 10 per cent. upon the amount of the ordinary capital, and to the dividends they had been paying on the preference stocks. They therefore awarded them, subject to the decision of the Court, the sum of £3,305,700. Curiously enough, none of the Company's Special Acts prescribe a fixed rate of dividend; but 10 per cent. on the ordinary capital was sanctioned by the General Act of 1847, which was incorporated in their Act of 1852. Twelve years later, they obtained their Act of 1864, by which they were empowered to raise additional capital by the issue of ordinary or preference stock. Under this and a subsequent Act the preference stock in question was issued, though no rate of interest was prescribed. These Acts, however, incorporated the Companies Clauses Act of 1863, section 13 of which provided that, in the event of no rate being specified in regard to the issue of preference stock, it was not to exceed 5 per cent. per annum. The Arbitrators justified their decision by stating that as no rate had been prescribed in the Special Acts, those named in the General Acts were applicable, and to these the Company were restricted.

The appellants' case could not have been in abler hands than those of Sir Edward Clarke and Mr. Haldane. The latter contended that the "paid-up capital" mentioned in section 75 of the Water-Works Clauses Act, 1847, meant the whole of the capital, and that if, for their own convenience, the Company made an arrangement by virtue of which certain of the shareholders should receive 5 or only 4½ per cent., this was purely an internal, or "domestic," provision, and was not in any sense in the nature of a "prescribed" rate in the terms of the General Act. Granting this, what was to be said in regard to the provision in the Companies Clauses Act fixing the dividend on preference stock at a rate not exceeding 5 per cent., in the event of no rate being prescribed? The learned Counsel met this difficulty by urging that the provision was only an arrangement made by the shareholders *inter se* as to the division of profits, and not a prescription of a rate within the meaning of the Act of 1847. He suggested to the Court that the Legislature could never have intended, by means of a General Act, to cut down the special rights conferred upon shareholders in all water-works undertakings. Sir Edward Clarke followed with arguments on the same lines; but they failed to convince the Court that the Arbitrators had come to the wrong conclusion. As will be seen by the report which appears elsewhere, their Lordships dismissed the appeal without troubling Mr. Fletcher Moulton to address them on behalf of the Water Board. The Master of the Rolls put the question at issue very concisely. He said Mr. Haldane's argument amounted to this—that, inasmuch as the 10 per cent. distributable had not been exhausted owing to some of the shareholders accepting lower rates, the surplus was available for distribution. The value of this argument depended upon whether or not there was a prescribed rate of interest for the preference shareholders. He thought Sir Edward Fry had correctly come to the conclusion that there was. It had, perhaps, been arrived at by a somewhat roundabout process; but there was a distinctly enacted limit of 5 per cent. in one case, and evidence of the exercise of a statutory power to fix 4½ per cent. in the other. Consequently the appeal failed. Leave was, however, obtained to have the views of the House of Lords thereon, if thought desirable.

THE INTERNATIONAL GAS EXHIBITION AT EARLS COURT.

THE short paragraph which appeared in the last issue of the "JOURNAL" has carried the intelligence throughout the gas industry that the Council of the Institution of Gas Engineers have determined—first, that the time is ripe for the holding of an International Gas Exhibition on the broadest possible lines, in order that it may be fully representative of the multifarious branches of the industry (both in respect of the manufacture and utilization of gas); and, secondly, that the machinery and influence of the Institution shall be applied to the utmost both in its organization and future conduct. That much is definitely settled; and the Council, through their Special Committee, are going to press forward with the preliminaries with all possible speed. It is their desire that all interested in the gas industry (and who are not who are concerned in the manufacture and sale of gas plant and appliances large and small, or the sale of gas either as producers or as shareholders in gas undertakings?) shall have the fullest information at once as to what is in their minds regarding the character and scope of the exhibition, and as to the material assistance they hope to receive with the one common purpose of making the exhibition a success—success not as alone represented by the quantity of goods that can be dumped down at Earls Court by the manufacturers of this country, the Continent, and America, but success as represented by the magnetic power of the venture upon the public and all who have in any way a personal concern in the progress of gas. Therefore, we have been asked to let it be known that the sketch the "JOURNAL" is giving of the scheme—rudimentary though the scheme is at this stage—may be taken as a suggestion or invitation to manufacturers at home and abroad to commence at once considering the matter of exhibiting, and the preparation of working models, photographs, and drawings of large gas plant, and actual specimens of smaller plant and goods. Of course, formal communications on the subject will be made later; but the question of time being an important one with gas apparatus manufacturers, the earlier they have the information that the holding of the exhibition is the certainty that it is, with the Institution as the responsible head, the greater, it follows, their opportunity for shaping their own arrangements. This is only the third week in April, and the idea is that the exhibition should open about the third week in November. This means that, from to-day to the opening, manufacturers have a clear seven months before them. As to the duration of the exhibition, the proposal is that it shall continue for a month.

The fact that the Council, on the recommendation of the Special Sub-Committee who have been dealing with this question, have resolved upon Earls Court and not the Crystal Palace as the place for the exhibition, may be open to some comment. But the relative suitability of all places was, it appears, very seriously considered by the Committee; and the members looked at the whole matter from the standpoint only as to what was best in the interests of the gas industry generally. The question of accessibility was regarded as being one of the most momentous. It was not the convenience of the representatives of the gas industry in and about London, nor of the public in London and on the south side in close touch with the London, Brighton, and South Coast Railway and the Chatham and Dover line that had to be specially studied, but of the far larger section of the industry and of the public who, to reach the exhibition, will have to make considerable journeys, and find themselves in London at the Euston Road termini, or Paddington, Marylebone, Liverpool Street, and so on. It was those who have to make long journeys to reach London whose convenience it was considered would be best served by holding the exhibition at a place that could be readily and rapidly reached by 'bus or the underground railway, without having to make a journey across London to one of the stations communicating with the Crystal Palace. In the opinion of the Committee, too, Earls Court offers better facilities in other respects than any other place in London for making a good exhibition.

As to the time of the exhibition, it is considered that the dark and cold winter months are most suitable for demonstrating the efficiency of gas lighting, heating, and cooking, and for gaining the eyes and ears of the public, who are not likely to care—it is altogether opposed to human nature—to give their attention to an essentially indoor exhibition of such a character during the summer months, when outdoor attractions are plentiful and more compatible with one's feelings than would be a show in which a large proportion of the goods on view would be generating heat, and adding their quota to the prevailing degrees Fahrenheit.

The next point is as to the organization of the exhibition. As already indicated, there has been in existence a small Advisory Committee appointed by the Council of the Institution; and this Committee have now been re-appointed, with power to co-opt anyone whose special experience it may be considered useful to obtain. The Committee also ask for, and will heartily welcome, suggestions from manufacturers to ensure completeness and success, and, in fact, the Committee will be pleased to receive communications from anyone who may have anything worth considering, either in the way of hints or of special exhibits. While, however, the exhibition will be carried out under the auspices of the Institution, they have appointed (as stated in last week's issue) Mr. F. W. Bridges, as the organizer. He will undertake the whole of the financial responsibility and the details of the arrangements, but will work under the direction of the Advisory Committee. He is, we understand, a gentleman of experience in exhibition work, and is blessed with considerable energy.

Speaking, however, of finances, there will be a large amount of expenditure necessary (which cannot be covered by the letting of space) for making the place attractive by providing popular entertainment quite apart from the exhibition. The latter without the former would not be particularly inviting; and bands (provided by the organizer) and concerts are among the contemplated subservient attractions. Conferences, lectures, demonstrations, &c., take a place in the draft programme; and prizes may be offered, perhaps not for any superiority of goods, but for general display and other attractive features, as well as in cookery competitions, and so forth. Again there is to be a loan section; and for this those who are good enough to lend articles of historical and other special value cannot be expected to incur expense in connection with them. But these are only a few matters that occur in connection with a large and comprehensive exhibition and demonstration of the position and power of the gas industry such as this is intended to be—encompassing anything and everything pertaining to gas manufacture, supply, and use—to show that the incidental expenses may be heavy. This being so, and as the whole purpose of the exhibition is the general good of the gas industry at large (without any of the responsibity for organization and conduct, which will fall upon the shoulders of the few voluntary workers), the Council feel themselves fully justified in asking Gas Companies and the Gas Departments of Local Authorities to share in the incidental outlay, by contributing to a fund to be specially formed for the purpose. It is also suggested that, in view of the outside attractions, there shall be a charge for admission; and it is intended to present a certain number of entrance tickets to the contributors to the fund. Gas Companies especially, this suggests, may find it very useful to get representatives of their local governing body to Earls Court, without expense to the latter. Of course, if the exhibition were held at the Crystal Palace, there would be the charge for admission. In reference to the "gate-money," one good suggestion that has been made is that a certain percentage of it, and of any profit apart from the space receipts, shall be handed over to the Institution for benevolent purposes connected with the gas industry.

On two or three of the foregoing proposals, there is a remark or two to make. It is earnestly hoped by the Council and the Committee that they will soon receive encouragement by offers from gas authorities of pecuniary assistance. Regarding the proposal as to a conference, this may fall through, on account of the difficulty of gas engineers being away from home for any great length of time just before Christmas; and what time they can spare, they will naturally desire to devote exclusively to the exhibition itself. The gas profession have abundant opportunities for conference without a special one on such an occasion; the Committee should concentrate their attention on providing interest for the public. One other point. Though still an open question, there is no doubt the Council will do wisely in keeping clear of awarding diplomas and medals for goods. There is the hidden rock there that might cause all sorts of trouble. Many other ways will suggest themselves in which prizes can be awarded—such as for the most attractive stands in the different sections, recognition of special services rendered by exhibitors, and competitions of various kinds, such as in connection with cookery, the general fitting up of apartments, and even the exhibitors' fitters and other workmen might have opportunities of displaying their skill in competitions. Artistic design might also be the subject of competition. There are, in fact, all sorts of methods by which interest and excitement may be stirred up even in connection with a gas exhibition. However, there is nothing settled yet; but these are things that are all "on the carpet" for consideration by the Committee.

The following is the general outline of the scope of the exhibition, as submitted by the Special Committee to the Council. It is about as comprehensive as it can be; but it is open to any amendment or extension which its further consideration or this publication may suggest, and which may meet with the Committee's approbation.

SUGGESTED SCOPE OF EXHIBITS.

FIRST DIVISION—LIGHTING.

Class 1.—Public Street and Open-Air Lighting; Artistic, Serviceable, Cheap, Decorative Lamp-Posts; Combinations of Street Lamp-Posts, with other Street Service Utilities; Brackets, Suspended Lamps suitable for Railway Stations, &c.; Lanterns, Decorative and Useful, for Outdoor Use; Reflectors; Refractors; Shades; Glass and Glazing.

Lighting Devices, Lanterns specially adapted for Particular Systems of Gas Lighting, Assisted Pressure Lanterns for Incandescent High-Power Lighting, Shadowless, and Storm-Proof Lanterns.

High-Power Lighting, with or without Mechanically Assisted Pressure; Combinations of High and Low Power Lights; Anti-Vibrators.

Class 2.—Flash-Lights (Gas), Danger Signals, Lighthouse Systems, Lighted Buoys, Illuminations.

Class 3.—Interior Lighting; Decorative and Special Lamps and Fittings for Churches, Municipal, and other Public Halls; Artistic Gas-Fittings for Interiors; Incandescent Burners; Regenerative Burners; Self-Luminous Burners for all Grades of Gas. Assisted Pressure Lighting Systems.

Lighting by Producer Gas. Self-Lighting Burners; and Devices for Lighting Gas from a Distance; Safety Extinguishing Devices. Reading and Professional Lamps, and Inverted Burners, Watch and Pilot Light Improvements. Globes and Glasses; Chimneys. Incandescent Mantles and their Manufacture. Shop and Warehouse Lamps and Lighting; Window Lamps. Governors, Regulators, and Indicators of all kinds.

SECOND DIVISION—COOKING AND WARMING.

Class 1.—Cooking by Gas on every Scale. Gas Cooking Stoves for all Markets. Special Gas Kitcheners; Accessories; Water Heaters, Rapid or Slow; Gas-Heated Baths. Applications of Gas to Various Domestic Purposes. Ventilation of Kitchens and Bath-Rooms. Systems for Hot-Water Supply throughout Houses.

Class 2.—Gas Fires and Heating Stoves, combination of Gas Fires with Cooking Stoves, and with Coal Fires. Gas Radiators, Condensing-Stoves, Ventilating-Stoves, Stoves adapted to Particular Uses, and Accessories.

THIRD DIVISION—MOTIVE POWER.

Class 1.—Gas Engines, Printing, Pumping, Ventilating, Driving Dynamos for Electric Lighting (in action).

Class 2.—Plans and Photographs of Works employing Gas Power.

FOURTH DIVISION—APPLICATIONS OF GAS TO INDUSTRIAL PURPOSES.

Gas-Muffles, Hot-Plates, Workshop-Stoves, Crucible Furnaces, Melting Furnaces, Blowpipes, Tobacco Drying, Coffee Roasting, Calandering, Shirt Ironing, Gas Iron Heating for Laundries and Clothiers, Type Founding, Paper Staining, Photography, Gas Traction, &c.

FIFTH DIVISION—SCIENCE IN RELATION TO GAS.

Photometers, Test-Burners, Calorimeters, Pyrometers, Analyzing Apparatus, Testing Appliances, Leakage Detectors, Indicating Safety Lamps, Indicators and Gauges, Detection of Electrolytic Currents in Gas-Mains, Coal-Testing, Coin Counters for Prepaid Collections, Checks and Safeguards, Improvements in Book Keeping and Recording, Time-keepers, Historical Exhibits.

SIXTH DIVISION—RESIDUAL PRODUCTS OF GAS MANUFACTURE AND ACCESSORIES.

Coke Burning Stoves and Fire Grates. Coke Breeze, Concrete, Briquettes. Tar and its Uses, Tar Products, Drugs, Dyes. Naphthalene, Naphthalene Tests and Prevention. Ammonia, Cyanides, Carbon.

SEVENTH DIVISION—ENGINEERING IN CONNECTION WITH GAS MANUFACTURE AND DISTRIBUTION, INCLUDING MEASUREMENT.

Machinery in Motion for Handling, Elevating, and Conveying. Gas-Works Materials, Fire-Clay Goods, Cements, Paints, &c. Retort Charging and Discharging Appliances. Condensers, Washers, Purifiers, Valves. Models, Plans, Photographs. Meters, Station, Inferential, Consumers', Slot Prepayment. Time-Cocks. Governors and Regulators. High-Pressure Gas Plant. Boosters. Carburetted Water-Gas Plant, Methane Plant, Mond Gas Plant.

EIGHTH DIVISION.

Miscellaneous Goods. Raw Material—Coal, Oil, &c.

Conferences, Lectures, Demonstrations, Competitions and Prizes for Purposes connected with the Advancement of the Gas Industry.

What has been sketched here is merely the undeveloped scheme of the exhibition—subject to modification and improvement, excepting in respect of those features already ratified by the Council of the Institution. As to the necessity of, and interest attaching to, the holding of a gas exhibition of a representative character, in view of the vast improvements that have been made, we need not speak, nor need anything be said as to its educational value. The suggestion that it shall be international in its scope, imparts additional interest to it; and we hope our friends abroad will do their share in making it so. The Committee are losing no time in getting to work. Last Friday they met again, and conferred for a considerable time with Mr. Bridges. A preliminary prospectus has been drawn up, and will be issued shortly.

The Engineering Standards Committee have lately been considering the question of screw-threads and limit gauges, and a large amount of information has been collected. With the view of obtaining a more general expression of opinion, it is proposed to hold a conference at the Institution of Civil Engineers, on the 19th and 20th inst., to give the Committee an opportunity of meeting the leading mechanical engineers of the country who are directly affected. It is proposed to ask for evidence on screw-threads from the users and makers of screws and the makers of tools for producing or gauging screws. A number of questions have been drafted bearing upon the sufficiency of the present Whitworth and B.A. screws for all practical purposes; the interchangeability, angle, pitch, thread form, &c., of screws; and systems of gauging screws. Evidence will also be taken as to whether it would be feasible to lay down a series of standard limits for various classes of work, and, if so, what these should be.

GAS WORKERS AND THE WORKMEN'S COMPENSATION ACT.

THE amendment of the Workmen's Compensation Acts, 1897 and 1900, is included in the Government programme of legislation for the present session of Parliament; but the Bill has not yet been printed, so that the nature of the proposals is unknown. Meanwhile, by way of preparing the public mind for a systematic revision of the effects of the existing Acts, "The Times" has published a communication on the premium rates charged by the insurance companies who insure employers against claims under the Acts. The heads of this statement, so far as the amount of the rates charged for different classes of workpeople engaged in or connected with the gas industry is in question, were given in a paragraph in last week's "JOURNAL" (p. 85). In view of the prospective action of the Government, however, it appears desirable to discuss the recorded facts with some particularity; and it is to be hoped that the matter will not be neglected by the different Employers' Associations meeting this summer. We are very anxious that no misunderstanding in regard to the merits of the subject should arise among gas managers; because we have always warmly applauded the principle of the Acts, and endeavoured to defend them from interested or prejudiced attack. It should also be remembered that the original Act was brought before the Incorporated Gas Institute in 1898, in a paper by Mr. C. Stafford Ellery, of Bath. In his paper, looking at the history of casualties in fifteen representative gas-works during the preceding five years, the author calculated that a charge of 2s. per cent. on wages might be regarded as competent to liquidate the liability so far as fatal accidents are concerned. Including serious accidents not fatal, as to which there was less information to go upon, Mr. Ellery concluded that "3s. per cent. would amply cover all risks on the new schedule of rates set forth in the Act."

Mr. Thomas Bower raised the subject before the North of England Association of Gas Managers on the 30th of April the same year; mentioning that certain insurance offices were quoting 25s. per cent. on gas companies' wages as the premium they should require for guaranteeing protection against claims under the Act. This charge he considered exorbitant; and an enquiry by the Committee of the Association followed, which reported at the meeting the following October. The practical result was that terms were obtained from "a good and sound office," under which a number of Local Authorities and Gas Companies insured under the Act at an average premium of 9s. 6d. per cent. This rate was anticipated by Mr. Ellery, in the paper already mentioned, who while arguing that gas-works with a wages bill of (say) £8000 and upwards should preferably insure themselves, considered that a premium of 10s. per cent. would be sufficient, under favourable conditions, to build up in a few years a fund equal to any contingency likely to occur. It was stated at the same time that the Federation of Engineering Employers were proposing to form a mutual fund for the purpose on a 9s. per cent. basis. The discussion on Mr. Ellery's paper is well worth reading again in the light of experience. Especially noteworthy are the expressions placed upon record deprecating the plan of insuring gas workers with insurance offices, for the reason that thereby the employers might be compelled to support the offices in any litigation against their own workmen.

The matter was again brought before the North of England Association in April, 1899, when an extended sliding-scale of wages bills and rates of premium was published by Mr. J. H. Penney, of South Shields, who had taken a leading part in arranging this business. In the following October, Mr. Penney was able to report that most of the Gas Companies in the North had been able to renew their policies under the Act at the reduced premium of 5s. per cent. Some weighty reflections on the subject of the alterations effected by the Act in the relations of employers and employed were included in the address delivered on this occasion by the President of the Association, Mr. W. Doig Gibb. He said, among other wise things, that they were only just learning the true meaning of the Act itself; and he expressed some doubts as to the way the statute would be worked by Trade Unions. Since this occasion, the subject of the working of the Act has not been formally debated by a gas managers' society. No systematized information exists, therefore, respecting the actual cost of carrying out the Act, or of the manner in which this is being performed by British gas undertakings, whether on their own account or through the intermediary action of insurance offices.

It appears to be the chief object of the "Insurance Correspondent" of "The Times" to discredit the bases upon which the Workmen's Compensation Act of 1897 was framed by the Government of the day, whose motive power in this movement was Mr. Chamberlain. Of course, it is the duty of a specialist to look after the interests of his particular concern; and we do not complain that the voice of the insurance expert has been raised in defence of the allegation that Mr. Chamberlain's original estimates of the probable cost of carrying out the Act were over-sanguine. These estimates put the cost of providing compensation at less than 1s. per cent. of the wages bill in many trades, while it was believed that it would in very few cases exceed 5s., and that 10s. might be regarded as the maximum. Mr. Akers-Douglas also is quoted as

having only last year referred to the "extravagantly high" rates at first asked by insurance companies, which he said had been greatly reduced, and might be still further diminished. It is now asserted in "The Times" that "this statement was the precise opposite of historical fact;" but, having regard to the recorded demands of the Tariff Companies—denounced by Mr. Bower at the time, and openly disregarded by other companies—it must be concluded that the Government observation in this connection is more nearly correct than that of their critic. True, the process of rate-cutting went rather to an extreme, as reported by Mr. Penney; but, after all, the revelations of "The Times" expert, as lately cited in the "JOURNAL," go no farther than an admission that Mr. Ellery's original estimate was exceptionally well founded. It is now stated, with all the pomp of an impeachment of the Government information, that the present rate for full indemnity for gas workers is 10s. 6d. per cent., and for legal indemnity 10s. per cent. This is precisely Mr. Ellery's figure. Where, then, is the Government's mistake? Certainly not in respect to the gas industry. Seeing how very uncertain was the prospect of what the Act might turn out to be when put to the test of actual working, in an untried field, Mr. Ellery's accurate forecast is something of which he has every right to be proud. And, on the other hand, the circumstance that such a forecast has been justified is a sufficient answer to those who pretend that the Act has proved disappointing in action. If any estimates were hopelessly wrong, it was those of the Tariff Companies in 1898. The competitive rate of 5s. for gas workers, now apparently abandoned, was secured by Mr. Penney after the first policies taken out by the Northern Gas Companies had run the first year. It seems to have proved unremunerative to the offices; but it was a mistake on the right side for getting business to them. If it is understood that 10s per cent. is nearer the safe limit, the temptation to employers to take their own risk will be greater.

As we have all along contended, the balance of advantage is all on the side of gas companies acting as their own insurers, except, perhaps, in the case of the smallest in the business. Insurance is doubtless the best policy for employers of the jobbing order, as well as for their workpeople; but in the case of gas workers and others whose employment is permanent and of the nature of a public service, the introduction of a third party is to be deprecated. It plays into the hands of the Trade Unions, and tends to magnify any hard cases that arise in the working of the Act. Where insurance is practised, what the claimant under the Act inherits is in many instances a lawsuit, instead of reasonable compensation. In theory, of course, it should not enter into the consideration of those who have to dispose of disputed claims under the Acts; but, in point of fact, the truth that the parties are an Insurance Company and a Trade Union is almost always mentioned to the Court. Certain practical considerations, mostly arising out of the limitations of the Acts, have been studied by the offices, partly with the object of diminishing the risk of litigation; and they result in the existence of two classifications of indemnity as "full" and "legal" respectively. In the case of gas workers, as will have been observed, the difference in the rates applying to these two kinds of risk is only 6d. per cent.—practically nothing at all. In some employments, on the contrary, the full indemnity rate may be double that of the "legal" class. The explanation is this: The meaning of the Acts has been expounded by the Courts with discrimination between certain occupations, places of work, and so forth. In order to cut the knot of all such disputes, several insurance companies have decided to contract with employers for paying all honest claims as coming within the meaning of the Act, which is undoubtedly the principle followed by private insurers. It gets rid of all disputes as to the height of a building in progress, whether the sufferer was actually at his proper work, and so forth. In the case of gas workers, there is small chance of such disputes arising, and accordingly the cost of their indemnification does not vary much; but in some occupations the openings for exception are more numerous, and are represented in the rates.

The critic of "The Times" pretends that the rate-cutting of some insurance offices in the past was "reckless," and that the Tariff Companies were not so far out in their original demands. This contention cannot be accepted; for, as a matter of fact, these companies have had to change their plans more than their rivals. After all, no insurance company has come to grief over these industrial risks; and several which were quite small concerns prior to 1897, have since expanded very notably. It is in the attack upon the framers of the original Act, however, that the criticism most egregiously fails. It is pointed out that "the average rate for nearly all trades is 16s., including mining and agriculture." But this average is not a fair one, inasmuch as it is made up by including the classes of stevedores and sawmill workers, whose risks are very exceptional, while the number of men to whom the highest rates apply is relatively small. The truth is rather that workers in factories, of whatever description, run pretty much the same risk; and the cost of indemnifying them from this on the fairest scale is, to a shilling, what it was valued at by engineers before the Act came into force.

It is argued that the cost of indemnity to employers is steadily increasing, chiefly by reason of the rapid development of the art of claim-making. Inasmuch as we have shown cause for holding that this figment of the increased cost of the Acts over the original estimates is a myth, it is impossible to agree that there has hitherto been anything to complain of in this respect. At the same time, it is open to be held that the expenses are greater than they would have been, in proportion, but for the boundary disputes, and litigation over the meaning of laws which are confessedly experimental. When the scope of the law is enlarged, there will be few, if any, boundary disputes; and a simple codifying Act would save much expense in other ways. The chief danger to the future value of the Acts lies in the agitation of the Trade Unions for the abolition or substantial modification of the two weeks' limit of the employers' liability, which in practice has been found to debar about 55 per cent. of accidents in number from being made subjects of claims, and rule out 40 per cent. of the cost of compensation. There is little fear that Parliament will listen to this demand, which would obviously be against public policy. In point of fact, there is never any real hardship in such cases; because where the injury is genuine, the matter is always considered mercifully. To give a legal cover to claims which might be sheer deception would not tend to bring harmony into the factory or the workshop, and would go far to spoil the whole scheme of beneficial legislation.

The foregoing statement of the actualities of workmen's compensation by Act of Parliament may, in our opinion, be regarded as being fairly trustworthy. We believe that whenever an Amending Bill is produced by the Government, it will be found to consist mainly of provisions to extend the operation of the existing law to occupations at present excluded, confessedly for experimental reasons which have ceased to have any validity. It is not likely that any considerable difference will be proposed in the financial bearings of the law, which have so far proved to be fair and reasonable. The effect of some of the decisions of the Courts may possibly be embodied in the new Act, and additional security may be given for the payment of compensation. Beyond these points, there is little to be expected. Probably after six years, the Institution of Gas Engineers may like to discuss the matter again in June.

ELECTRIC LIGHTING MEMORANDA.

The Efficiency of Electric Power in Factories—The Detection of Leakage in Electricity Distribution—Methods of Testing Low-Pressure Networks—The Prospects of Power-in-Bulk Schemes.

IN the competition for business, providers of electric power are accustomed to make light of the capabilities of the gas-engine, unless they are faced with realities which cannot be gainsaid. A useful contribution to the data available for elucidating the problems likely to arise in the equipment of factories with different kinds of power, is a paper by Mr. B. Longbottom, lately read before the Manchester Association of Engineers. One of the perplexities of power-users is to know what source to decide upon, and another is in respect to the degree of subdivision of the power which will be most expedient. The choice lies mostly between a number of small engines driving separate machines or groups by means of shafting and belts, and a single large engine serving the whole of the works in a similar manner. As far as steam power is concerned, the former system is most unsatisfactory. The waste of small, scattered steam-engines is very great. Where the nature of the work to be done allows of the concentration of the power in a single engine, as in the case of a cotton mill, this is the most economical arrangement; about 75 per cent. of the power of the motor going into the work. Where sectional gas-engines are used, about 55 per cent. of the power generated is utilized, but not more than 60 per cent. where electric power is employed. This calculation assumes throughout that the conditions are fair, and that the engines and tools work at an average of three-quarter load. So far as efficiency of distribution goes, therefore, the gain by the electric drive is only this difference of 60 and 55 per cent. This is the most important datum. It is recommended that all tools under 5-horse power should be grouped for safe and economical electric driving; this being taken as the average unit, with exceptions for 7½, 10, and 15 brake horse power motors for heavy tools. It is admitted that the lowest price at which the unit for power purposes can be bought from an outside supply undertaking is from 1d. to 2d. for small shops. Gas-engines up to 175-horse power, working at three-quarter load, with ordinary gas at 2s. per 1000 cubic feet, will generate the unit on the spot at not more than 0·6d. Something more than the superior distributive advantage of 5 per cent. is required to equalize these costs.

The paper of Mr. W. E. Groves on the "Localization of Faults on Low-Tension Networks," which was commented upon by the "Builder" on the 19th ult. (having been read before the Birmingham Local Section of the Institution of Electrical Engineers on March 16), has now been published in abstract in the "Electrician," and in full in the "Electrical Review." The former electrical journal also makes it the subject of a leading article. The matter of the paper itself is something upon which we cannot pretend to pass judgment, as it is intensely technical. Indeed, it has rarely been our fortune to come across so highly specialized a paper. Anyone who could pass a textual examination upon it ought to be admitted to rank at once, so far as paper-work goes, as a fully qualified electrical engineer. So much will be conceded after a first glance at the writer's list of "tests and trials," which he says he has found it convenient to employ, presumably with

regard to the Birmingham electricity distribution system. These are: (*a*) Observance of the reading of recording ammeter permanently connecting the neutral to earth through a low resistance; (*b*) joint insulation by "Russell's method"; (*c*) checking polarity of fault by observance of feeder ammeter when "flashed"; (*d*) detection of faulter feeder by "flashing"; (*e*) partial localization by means of "transferring"; (*f*) location by disconnection to shortest length; (*g*) final localization by induction method. It will strike many readers of this array of tests and trials that the hunting of electrical leakages must afford ample occupation for a station engineer with an inquiring mind. Turning to the "Electrician" for a sorely-needed editorial explanation of all this technicality, we learn, not with surprise, that the testing of the mains is a branch of electric light and power cable engineering which is much neglected. It is asserted by our contemporary, indeed, that in the vast majority of electricity undertakings the testing of mains is "almost disregarded;" and there is more than a hint that so long as the fuses stand, it is not usual to take any heed of the quantity of electricity "going to grass" from the distributing system. We should have been reluctant to allege so much of a business which is nothing if not "scientific."

The ultra-scientific nature of everything electrical, as distinguished from the crudities of gas manufacture and supply, has been proclaimed from the housetops ever since electric lighting became a trade; and some people even believe it. Yet, actually, the "Electrician," which ought to know the facts, makes no bones about asserting that "the average station engineer" prides himself on being a "practical man," and as such excludes testing instruments from his domain "with as much rigour as an inquisitive and short-sighted science student would be kept away from the high-tension machinery." There is much more vigorous denunciation of the station engineer who does not take enough interest in such matters to discover and remove faults before they have become bad enough to affect the supply at all, or do any damage. To think that the reputation of electricity supply as a "scientific" performance should be so traduced by its friends! The facts are sufficient to warrant all the mistrustfulness of electricity distribution methods which those who are answerable for the preservation of gas and water mains in localities where these things are done, have ever manifested. We remember even that some electrical journals took it upon themselves to abuse, as traitors to their cloth, certain electrical experts whose advice was sought in regard to these matters by the custodians of the imperilled property. Whatever may be thought in electrical circles as to the novelty of Mr. Groves's paper and the testing systems he describes—and the "Electrician" remarks that efficient methods of testing the soundness of electric distribution networks are common knowledge—the chief thing to be insisted upon now, in the interests of all concerned, is that there should be no shirking the question of leakage in central station accounts. To every responsible officer of such establishments should henceforward be put the query: "Do you know how much you are losing by leakage?" Thus possible difficulties in Parliament might be obviated.

A debate on electricity-in-bulk power schemes, with reference to the conditions prevailing in the United Kingdom, has been held by the Leeds Local Section of the Institution of Electrical Engineers. The case for such undertakings was advocated by Mr. W. B. Woodhouse, who once more paraded the hypothetical arguments in favour of the generation of power on a large scale—the saving of working in the largest way, and for diversified consumption, and so forth. In support of his side, Mr. Woodhouse cited a number of examples of the working costs of small central stations, supplying districts up to 20,000 inhabitants, and compared their charges with the schedule of the Yorkshire Power Company. In opposing the proposition, Mr. W. Emmott denied that large power schemes are wanted in this country at all. He asserted that any possible economy which might be effected by the Power Company in fuel would be swallowed up by the costs of transmission. On the whole, the discussion was very much in the air; as must be the case with all such controversies, until the test of experience has proved whether the big power schemes are fated to lose their capital or earn a living profit. There is much to be said for the opinion that the concentration of working which is the fundamental reason for the existence of a power-in-bulk scheme will prove disappointing in the majority of instances; but, on the other hand, nobody can be absolutely certain of the fact in advance. The only positive bit of experience that has hitherto been realized in respect to the generation and transmission of electricity in bulk is that of the Metropolitan Electric Lighting Companies, who are, either for themselves or in association, setting up Becktons on their own account. They are doing this, not so much for economical reasons as because necessity compels them to have recourse to this expedient. But they do not find that the actual saving is anything considerable.

The Cost of Private Bill Legislation.—On the reassembling of the House last Tuesday, Mr. Lewis put to the First Lord of the Treasury the question on the above subject which was given in the "JOURNAL" a fortnight ago (p. 19). Mr. Balfour said he did not by any means look at one side of this matter; but he hoped the Government might carry further the reforms already initiated. He added that the Committee on Private Bill Procedure found that the fees actually charged formed a very small fraction of the total cost of Private Bills.

THE "QUESTION-BOX" SYSTEM EXAMINED.

A NEATLY bound volume representing the "Question-Box" of the Ohio Gaslight Association, as presented at the twentieth convention held at Cleveland in March, has been received; and our first words must be of congratulation to Mr. Henry L. Doherty, the editor, on the thoroughness and ability with which he has performed his work. The task which the question-box imposes upon him is by no means a light one; and it is with sincere regret that his intimate acquaintance with this means of putting interrogatories for the purpose of eliciting information for the common good should have produced any depreciation of his estimate of the value of the system. But there is no ambiguity about the opening words of his introduction. "After another year's experience as editor of the question-box, I am," he writes, "less certain of its value than I was a year ago." The communications addressed to him on the general subject during the year have been of a mixed character, comprising criticism, compliments, suggestions, and comments. It must be held—from in parts a careful and in others a cursory perusal of the contents of the present volume—that if in any way the criticism disparaged the personal labour of Mr. Doherty that it was ill-deserved. In the present volume it is found that there are 494 questions on all manner of subjects, and in every case a plurality of replies. In addition to the correspondence involved, the work of collating these must have been immense. In some instances, the questions are of the flimsy character that one might expect to emanate from the 'prentice hand; there are others that are of that particular penetrating kind that brings out information that adds to the sum of human knowledge, and that evokes new experiences that merit trial where trial has not been made before; and there are others that unfold to the light variations in practice. The last two are very helpful types of questions; and they alone are sufficient to mark the system of the question-box as valuable. At the same time, one ends the reading of the replies to certain of the questions with a dissatisfied feeling. This fragmentary method of obtaining information on important technical problems and matters leaves, in many cases, the inquirer with the bare answer, or with little in the way of explanation as to how the results quoted in the answer are obtained, and an utter absence of reason for them. It would be an invidious thing to ask the editor to individually accept the duty of separating the wheat from the chaff; but, if something of the sort could be done, it would, in our opinion, bring the "question-box" volume down to admirable limits, and enhance considerably its value. But there is some amount of compensation in the fact that the volume is divided into sections—viz., Gas Manufacture, Distribution, Office Methods and Accounting, Appliances, New Business Matters, Legal and Financial Matters, Residuals, Management, and Miscellaneous. Above all there are three complete indices at the end, the last of which enables the inquirer to immediately turn up the questions and answers on any subject in which he may be particularly interested.

We cannot hope to traverse for the benefit of "JOURNAL" readers the whole 350 pages or so of which the volume is composed; but, in anticipation of any Association in this country considering the question of taking a leaf out of the book of our American friends, and adopting this question-box method of deriving information as to the practice and experiences of fellow engineers and managers, it will perhaps be useful to run over Mr. Doherty's introduction, which is constituted in part of material suggestion for guidance in making such a system of general advantage. In the first place, the questions asked should be as practical as possible. They should also be definite, and cover all essential information required by those who might be induced to attempt an answer. The inquiries should cover, first, all essential information desired; secondly, questions intended to expose popular error; and, thirdly, questions for the purpose of introducing new knowledge not of sufficient extent or importance for the production of a paper. On the other hand, those answering questions should express something more than an assertion, and, wherever possible, should give the reasons for their answers in a way that can be understood by any reader, whether possessing an extensive education or not, or by the newest man in the gas business. The answers, too, should be as brief and concise as possible; but, of course, simplicity and clearness are more desirable than brevity. If the question asked does not give all the necessary data for its answer, then the most natural conditions should be assumed, and the assumed premises stated. The answer can generally be applied by the person wanting the information, and is very apt to prove of value to others even if not valuable to the questioner.

Mr. Doherty deals with the general criticisms that have been made of the previous compilations; but we cannot regard those criticisms as being of sufficient weight to depress him or any of those who have rendered him assistance in the carrying on of this feature of the Association work. From his reply to those criticisms, it is very apparent that his labours are not studiously lightened by the members, and that is always the drawback in new effort of this kind. Too much is left to the "willing horse." The editor refers to the point that has already been raised in this notice, as to the desirability of knowing the reasons for certain answers; and it appears that he has attempted to obtain them in some cases for the present publication. But he is faced by the supreme difficulty of getting answers at all in several

instances. Therefore, he is thankful for any answers sent to him, and is sorry that others did not submit incomplete answers rather than make no contribution. It would seem from this that the total of the question-box contributors was small; but, turning to the index, it is found that the answers emanated from 150 different sources, which, in our view, should be rather encouraging than otherwise. True, several of the correspondents only answered one question; but the bulk of them sent replies to numerous inquiries. On the whole, it must be submitted that a lively and encouraging interest is taken in the question-box of the Association. Mr. Doherty, however, is not altogether satisfied, as he is found later on to remark that he does not think "the gas men of the country appreciate the work, worry, and expense of the undertaking, or they would accord it greater support." And further he asks "how a more general participation may be secured, and particularly from those best able to contribute." Again, "I fear some of our ablest men consider it beneath their dignity to lend their assistance."

One of the other criticisms is that many of the questions are wrongly answered, and are liable to lead unknowing ones astray. This requires the citation of example to substantiate its accuracy. But evidently there is some truth in it, as the editor professes his inability to correct all errors, and remarks that it would be rather presumptuous on his part to attempt to censor the answers offered. The questions may be erroneously answered, they may be incompletely answered; but Mr. Doherty fixes the responsibility by appending to each reply the name and address of the author, with whom, of course, correspondence can be opened for further information, or for the reasons for the answer given.

The system of the question-box has, as shown, grown to a very large thing in connection with the Association; and therefore the members could ill-afford to give up (as some think they might) the time at the meetings for oral responses to be made—for instance, to the 494 questions figuring in the present volume. This being so, it is impossible to conceive of any other form in which the work could be better dealt with than the one which Mr. Doherty presents in this volume. He confesses that the system is not perfect in the present shape, and never will be; but it is hoped that improvement will continue. It has, however, its educational advantages. It should cause serious thought, and inspire study and investigation. It offers a means of locating valuable engineering data, and bringing to the surface unknown talent. It is bound to expose many popular errors, and secure their correction; and it cannot fail to suggest material for Association programmes and research work. It offers, too, an avenue for information possessed by one being made common to all, and which information can be presented after the application to it of the mature consideration and judgment which the system allows.

On the whole, one leaves the examination of the volume representing the question-box work of the Ohio Association for the past year with the feeling that it is—notwithstanding the disappointments mentioned by the editor, and the expression of his view that he is now less certain of the value of the work than he was a year ago—a system, with (if possible) judicious selection, worthy of imitation on this side. That it is a popular one is undeniable from the one fact that the volume contains double the number of contributors and of contributed answers of that of the year preceding. It may be useful to those connected with Gas Associations in this country who are interested by this notice to learn that the expenses incurred in the publication of the volume this year have been borne by advertisers. But there is another side to the financial question—viz., that the expenditure for the postage and stationery alone in the work is considerable, and beyond the means of the Association. If Mr. Doherty's aspirations are realized as to the further development of the system, the task will become a formidable one for him, and the expenses will follow the same route. Then should the work reach in either respect unmanageable proportions, the Association will have to face the duty of conferring upon (say) a Committee some censorial power. It cannot well be otherwise.

AN EXAMINATION OF THRELFALL'S WORK ON THE FLOW OF GASES IN PIPES.

THE practical importance of the subject-matter of the paper on the "Motion of Gases in Pipes," by Professor Richard Threlfall, F.R.S., of Birmingham, which was recently read before the Institution of Mechanical Engineers, and of which an abstract was given in the "JOURNAL" last week (p. 99), will be understood from the author's explanation, that his purpose in investigating it was to apply the results to a new system of inferential gas-meters suitable for the measurement of "Mond" gas. If producer gas is ever to be sold by meter, some more suitable appliances for use in this business than the ordinary wet gas-meter will be greatly needed. At the time of the passing of the South Staffordshire Mond Gas Bill, mention was made of the possible employment of proportional meters for the purposes of the Company; and the use of such measuring instruments was legalized—a proportional meter being defined to mean "a meter which measures and records a constant fraction of the total quantity passing through the meter." This description appears to refer to positive measurements, though of a known fraction of the total delivery; and it may be questioned whether the words cover the use of a wholly inferential system of meterage. This, however, by the way. The facts probably are that inquiry revealed the unsatisfactory character of the only proportional gas-meters known in practice, which must be looked for in the United States, where they have been tried by several companies supplying natural and manufactured gas. The verdict is that they are not trustworthy; the obvious difficulty in the way of their reliable operation being the ever-varying relation between the friction of a small meter and the pressure of the main gas supply.

Faced with this failure of proportional gas-meters of the positive class, Professor Threlfall turned aside and sought for what was wanted in the class of inferential appliances. This immediately led him to consider the possibilities offered by the principle of the Pitot tube—the well-known instrument for indicating differences of the velocity of fluid streams by the corresponding pressures exerted on the fluid contents of tubes in connection with them. Supposing these pressure-indicating tubes to be like the water pressure-gauges with which gas engineers are so familiar, it is evident that if one of them is mounted on a pipe carried into a fluid stream, with the lower open end turned round to face the current, the momentum of the stream will force the water in the gauge to a higher level than that attained in a corresponding gauge also connected with the stream, but not facing the current. The difference is a measure of the force—that is, of the velocity of the current. From this the quantity of the flow can be calculated by multiplying the unit into the unit of cross-section of the stream.

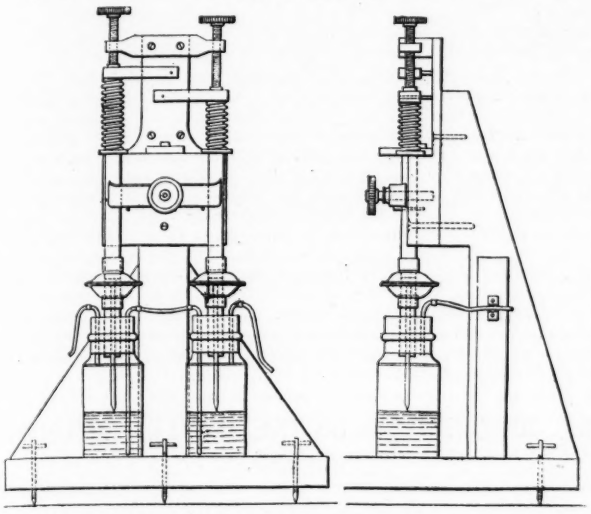
Simple as the problem looks, its solution in a satisfactory manner, so as to make it the basis of a trustworthy meter for measuring (say) producer gas, entails the preliminary disposal of very many practical difficulties and sources of error. Professor Threlfall does not err on the side of minimizing the difficulties of the translation of phenomenon into mechanism. He is only too ready to propose assumptions of causes of interference with the operations of velocity and pressure. He considers how the velocity of the stream may be affected by the presence of the tube, and judges it necessary to assume that the motion of the gas is steady, without turbulence, and that "the stream-lines impinge normally on the open end of the tube and there terminate, the gas being annihilated after being brought to rest." There is an air of pedantry about this style of treating the plain issue of how a moving mass of fluid hits the open end of a small pipe opposed to it, for which Professor Threlfall was twitted by Professor Unwin, who remarked that this part of the paper was encumbered with a number of irrelevant considerations. Talk about the "annihilation" of the gas in this connection is confusing.

To all intents and purposes, the flow of the fluid in such a system as is here contemplated strikes the open end of the pressure-gauge pipe as a plane surface. As such, Dr. Glazebrook and the staff of the National Physical Laboratory have been working at the problem for the last eighteen months. The immediate result has been to determine the relation between the velocity and the pressure. Theoretically, the law is stated in Torricelli's theorem of the flow of fluids, $V = \sqrt{2gh}$; where g is the acceleration due to gravity, and h is the head of the free surface above the point of efflux. In effect, this means that when the open end of a pipe is held in a stream opposed to the current, the height to which the fluid will rise in the pipe is equal to the head under which the stream is flowing. It turns the system into a syphon, of which one leg and the bottom are formed by the stream, and the pipe forms the other leg. But, in fact, there are qualifications which interfere with the realization of the theoretical level result. Disregarding the viscosity of the fluid, the formula approved by Professor Threlfall and Dr. Glazebrook is $V = \sqrt{\frac{2P}{\rho}}$; where ρ is the density of the gas. The latter states that the method of measuring velocities by the Pitot tube is good up to velocities of 3000 feet per minute.

In applying the Pitot tube to a main conveying gas under pressure, it is usual to measure the statical pressure by another gauge, simply connected into the side of the main at right angles to it. If this tube is too large, a suction effect may be produced in it by the passage of the current of gas—a point for the consideration of gas engineers in regard to other gas-pressure measurements. A disc put in front of the hole in the main will stop the suction effect. The next step is to measure the difference of levels between the gauge showing the statical pressure of the gas in the main, and that showing the force of the flow of gas. This in the case of a gas current is a very small dimension indeed. Professor Threlfall has devised an apparatus, shown in the figure on next page, for measuring a difference of level of two liquids with certainty to within 0·01 millimetre. This result is obtained by using areas large enough to be free of capillary uncertainties, and by ascertaining the position of free liquid surfaces by adjusting them to contact with fine needle points.

The apparatus is so constructed that the actual measurement is made by vernier callipers or micrometer screws, and all attempts at observing scales through the walls of glass tubes are avoided. An improved form of the instrument is made by the Cambridge Scientific Instrument Company. Professor Threlfall also refers to the modification of Péclet's differential anemometer, by Fletcher and Swan, used by the Inspectors under the Alkali,

&c., Works Regulation Acts. This apparatus is described and illustrated in Lunge's "Sulphuric Acid and Alkali," Vol. I, p. 562 (Third Edition). In this, the suction-effect already mentioned, as being produced in a thin tube by the passage over its open end of a gaseous current, is combined with the action of a Pitot tube. Another anemometer described in the same work is Fryer's, which measures the difference of pressure on each side of a dished copper plate. It will measure a pressure of 0·003 inch. Professor Seger's is another instrument for measuring differences of gas pressures to a small fraction of a millimetre. It has the advantage of being much cheaper and easier to handle than most.



Whether the instrument of Professor Threlfall is an improvement on the others remains to be seen. The point to be noted here is that anyone who desires to avail himself of the Pitot tube for measuring the velocity of gas or air in a main is at liberty to follow various ways of doing so. Indeed, Professor Unwin allowed himself to remark that apparently Professor Threlfall was not very well acquainted with the vast amount of work that has been done with these tubes.

The next point to be settled is the proper place in a gas main or conduit for the ends of the pressure-tubes, in order that they may be acted upon by the mean velocity of the current. Of course, the maximum velocity is in the axis of the pipe. Incidentally, by abandoning the suction element in the Fletcher gauge, and working with the Pitot member alone, which gave more consistent results, Professor Threlfall confirmed the truth of the expression $P = V^2$; in other words, that the pressure of a gaseous flow is equal to the square of the velocity. Or it might be stated in another way, that this expression exactly covers the behaviour of the Pitot tube. The final result of experiment is velocity in feet per second:

$$V = 12{\cdot}45 \sqrt{\text{Pitot tube pressure in mm. of water}}$$

for air under standard conditions. A different multiplier can, of course, be used for making the correction necessary for air under other conditions.

In order to locate exactly the point of mean velocity, observations of smoky air currents were undertaken. It was shown by Darcy, in the case of the motion of water in smooth pipes, that the mean velocity is to be found in the circumference of a circle whose radius is 0·689 of the radius of the pipe. The mean velocity is that which, when it is multiplied by the area of section of the pipe, will give the delivery. It has hitherto been usual to apply this result of Darcy's to the flow of gases generally. Professor Threlfall claims to have ascertained that for velocities ranging from 600 feet to 3500 feet per minute, the distribution of velocity in a pipe is not affected by the velocity itself; so that the location of the Pitot tubes can remain fixed. Experimentally, the circle of mean velocity has a radius of about 0·775 of that of the pipe. This, therefore, in the case of a gas, should be the position chosen for the opening of a Pitot tube which it is intended to use as a basis for measuring the flow of the gas. If the position of the opening of the tube is placed in the middle of the pipe, the reading must be corrected by using the ratio of mean to maximum velocity, 0·8038.

An interesting feature of Professor Threlfall's work was the testing of the foregoing deductions by the delivery of air through a 6-inch pipe from a gasholder. The holder could be set to fall at different rates; and the average of the momentum pressure observations of the resultant flow was in fair agreement with the actual discharge, for velocities ranging from 1284 feet per minute to nearly 3000 feet per minute.

Here, apparently, investigation and criticism end, and the work of construction of a meter on these ascertained data must proceed. Professor Threlfall's meter consists of an electro-dynamic device whereby the pressure corresponding with the flow of gas is automatically balanced by the pull of a measured current of electricity. He also uses a "stream gauge," for indicating the force of the flow. It is scarcely likely that these pieces of mechanism represent the last word that can be said concerning the inferential measurements of the delivery of gas in pipes; and those engineers who are interested in the subject are recommended to pay attention also to the capabilities of the Bazin tube and the Venturi tubes, for adaptation to this purpose.

THE FIDDES-ALDRIDGE SIMULTANEOUS DISCHARGING-CHARGER.

The interesting development in retort-house machinery with which the names of Mr. W. W. Fiddes and Mr. J. G. W. Aldridge are united, has been little heard of during the last few months; but this must not be taken to indicate that the inventors have been idle. On the contrary, the time has been spent in designing and constructing a machine which, it is expected, will, in the course of a few weeks, find its way into a gas-works, from which in due season there will come the results of actual experience.

The machine and its unique characteristics were fully described in the "Journals" for Sept. 8 and 15 last. Readers will perhaps remember that by one operation of the machine a through retort is discharged and charged; the spent charge being cleared from the farther end of the retort by the push-plate portion of the machine which conveys in the new charge of coal, and which charge is laid in its place in the retorts at practically the same moment that the last piece of coke is falling from the farther mouthpiece. In other words, the coal-conveyor running into the retorts acts as a ram; the spent charge being pushed out by its head. The raising and lowering of the machine from one tier of retorts to another, the traversing of the machine along the floor of the retort-house, and the operations of discharging and charging the retorts, are all accomplished by an electrically driven motor on the machine, the entire working of which is under the control of one driver, whose standing position on the machine is such that he has the levers well within reach, and can see all that has to be done. The motor is of 5½-horse power; but the machine can, if desired, be driven by any other power than electricity. The machine is designed to deal with retorts up to 22 feet in length from one side of the retort-house only.

It follows from this—and this is the great feature of the invention—that one machine in one house of reasonable size with three men (the machine man and a lidsman on either side of the bench) is intended to perform the whole of the discharging and charging—these operations being carried on simultaneously. It is estimated that the three men with the one machine will be able to deal with from 160 to 200 retorts.

Mr. Fiddes has, in view of the near approach of the completion of the building of the first machine for practical use, prepared a little statement of the advantages claimed for this system of retort working. He says: "As this machine does all its work from one side of the retort-house, the following plant is essential in the house, to secure a minimum working cost: (1) A continuous coal-hopper, fitted with a feeding door and lever for each arch of retorts. (2) A coal-conveyor for supplying the continuous hopper with broken coal. (3) A pair of rails for the machine to traverse the house. (4) Two bare electric wires, supported from the roof, or from the walls of the retort-house. (5) One coke-quenching conveyor for receiving and carrying away the ejected coke." The coke-conveyor is, of course, placed on the far side of the bench; the other plant being on the same side of the house as the machine.

As stated by Mr. Fiddes, the claims for this system of stoking are these: "⏢ horizontal through retorts up to 22 feet long can be discharged and charged, and the machine withdrawn from the retort, in about 20 seconds. The combined operation of discharging and charging is done by the one forward stroke of the machine; the backward stroke levelling the coal to even thickness throughout the length and breadth of the retort. When required, the machine may be used to discharge only. The heat of the retorts is not lowered by the lids standing open between discharging and charging as heretofore—hence a greater yield of gas and a saving in fuel should follow. The charges can be worked off in less time; giving a saving of from 60 to 80 minutes per charge. This saving per charge means that heat, which would otherwise have been wasted, is utilized in working off the first portion of a second charge. The charge being laid lightly and of even thickness, a greater number of charges can be worked off in the twenty-four hours. There is practically no smoke, flame, or dust in the stoking operation as heretofore. Flame or smoke being scarcely perceptible at the mouthpieces throughout the operation, a much larger yield of gas should result. The machine being always filled with coal while in the retort, it is not damaged by the heat; nor does the machine itself damage the retort, as it rides upon the coal it contains." Dealing with this point a little later on, Mr. Fiddes says the front plate of the machine is so constructed that, in discharging, it grips and consolidates the soft portion of the coke which lies upon the near mouthpiece, thus raising the front of the machine, and holding it rigidly away from the sides and floor of the retort during its travel. "The whole operation is performed without the retort being struck in any way; the coke being

ejected smoothly, and the coal simultaneously laid in its place lightly and gently."

Among other stated advantages are these: "The saving in fuel which results from the charges being worked off 60 to 80 minutes earlier than heretofore, is calculated to more than pay the wages of the machine driver and lidsmen. The coke is ejected without heaping in the retorts, or being otherwise broken, as was successfully demonstrated by Mr. Fiddes, when experimenting with coals from the various coal-fields of England and Wales, at which time little or no breeze was produced. The machine will work equally as well and economically in a stage or ground-floor house. A measured quantity of coal is automatically delivered into each retort. Machine broken coal, slack, or dust coal can be charged by the machine; and the driver is not exposed to steam, smoke, or flame."

It will be of great interest to see as early as possible whether the numerous advantages which the experimental work has disclosed will be sustained in everyday practice with the improved machine.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 184.)

THE Stock Exchange has had another brilliant week. The general buoyancy carried all markets up; and the business was not all professional, but comprised some good, solid investing. Prices rose freely; but happily the runaway pace received a healthy set-back now and then by realization of profits. The improving tendency, however, was not impaired; and the closing tone was very favourable. The fortnightly settlement was an easy and pleasant operation, which sometimes it decidedly is not. The supply of money in the Money Market was over-abundant; and the reduction of the Bank-rate on Thursday to 3½ per cent. (from the 4 per cent. rate fixed on Sept. 3 last year) was fully discounted in advance. But so much money was locked up in deposits on County Council stock, that the supply was reduced until that could be liberated. The Gas Market had a notable week. The advance in quotations which we forecast last week has commenced in real earnest; and undertakings in all parts of the globe have had already a more or less considerable improvement. The Daily Press, which cannot refrain from exposing its ignorance of gas matters, attributes the movement to good coal contracts! Although the rise was universal, yet the actual transactions—and they were unusually numerous—were to a very great extent restricted to the biggest issues. This is probably owing to there being a paucity of stock in general on the market. Sellers recently have sometimes found themselves unable to deliver; and the movement is against them. In Gaslight and Coke issues, the ordinary was extremely active; and Saturday was the busiest day. The price rose from 88¼ to 94, closing firm. The secured issues were almost forgotten; but the debenture rose. South Metropolitan was very brisk; and rose from 118½ to 124½. Commercials changed hands at a smart rise. Hardly any business was done in the Suburban and Provincial group on the Exchange; but good prices were obtained at the Mart. A large number of undertakings advanced their quotations. The Continentals rose like the rest, though they were far from busy; and the remoter undertakings did the like. In Water, there was a little more activity in dealings, but hardly any movement in values.

The daily changes were: On Monday, Commercial 3½ per cent. rose 2. On Tuesday, both Brentfords rose 3, Gaslight ordinary 2, and Union and Imperial 1 each. On Wednesday, South Metropolitan rose 2, and Commercial 3½ per cent., Gaslight debenture, and British 1 each. In Water, East London debenture fell 3. On Thursday, Union preference rose 3; ditto ordinary, both Brentfords, both Commercials, Crystal Palace, Gaslight ordinary, South Metropolitan, and West Ham, 2 each; Imperial, 1½; Gaslight debenture and both Brightons, 1 each; Europeans, ½ each; and Bombays, Ottoman, and River Plate, ¼ each. On Friday, Brentford old rose 3; ditto new, South Metropolitan, and Lea Bridge, 2 each; Gaslight ordinary and Crystal Palace, 1 each; and Bombay old and Buenos Ayres, ¼ each. On Saturday, Monte Video rose ½. In Water, West Middlesex debenture rose ½.

The Manchester District Institution of Gas Engineers will hold their next quarterly meeting at Stoke, on Saturday, the 14th prox. The adjourned discussion on the papers presented at the annual meeting in February will not be taken; but the question of affiliation will be brought forward.

The Bacterial Treatment of Sewage.—Since the publication of the third edition of Mr. W. J. Dibdin's work on "The Purification of Sewage and Water," which contains a full account of the position of the question up to June last year, improvements have been effected in the purification of sewage by the agency of bacteria unaided by chemical processes. In compliance with repeated requests, Mr. Dibdin has written a short account of the rise and progress of modern methods for treating sewage, accompanied by a description of his multiple-surface bacteria beds, for which he has taken out a patent (No. 16,851 of 1903). The pamphlet is issued by the Sanitary Publishing Company, Fetter Lane.

PERSONAL.

Lieut.-Col. H. LE ROY-LEWIS, D.S.O., has been elected to the seat on the Board of Directors of the Imperial Continental Gas Association, rendered vacant by the death of Colonel Josiah Wilkinson, which was recorded in the "JOURNAL" for the 27th of October last.

At the meeting of the Institution of Civil Engineers last Tuesday, it was announced that Mr. H. B. MARTEN, who is engaged at the Long Ditton works of the Lambeth Water Company, had been transferred from the class of associate member to that of member. The monthly ballot on the same occasion resulted in the election as associate members of Mr. A. H. QUICK, of Nunhead, and Mr. C. CLEMENT WALKER, of Highgate.

At the Derwent Hotel, Whatstandwell, on the 9th inst., Mr. ROBERT SANTY was the recipient of a testimonial of the respect in which he is held by the officials in the Secretary's department of the Derby Gas Company, on the occasion of his retirement after 27 years' service. The presentation, consisting of an easy-chair, was made by the Secretary (Mr. H. Bullivant), who spoke in terms of high appreciation of the way in which Mr. Santy had discharged his duties, and expressed the hope that he might live long to enjoy the esteem of his friends, and to recall, while resting in his chair, his many happy associations with the Gas Company. Mr. Webster, on behalf of the staff, bore testimony to the good fellowship which had always existed between them, and endorsed the remarks that had been made. Mr. Santy, in responding, thanked his colleagues for their good wishes, and acknowledged the kind consideration the Directors of the Company had shown towards him on his retirement.

MR. GEORGE HELPS ON THE SETTLE-PADFIELD PROCESS.

A REPLY BY MR. HELPS.

Mr. Humphrys, in the "JOURNAL" of the 5th inst., becomes less interesting and more personal—so much so, that I cannot distinguish between remarks that may have reference to the above process and my own person; and I would suggest to him that anything he may have to say as to my individual capacities be discussed privately, as this phase of a controversy is clearly not for a technical paper.

Most of the points submitted and contained in the "JOURNAL" of March 22 still remain unanswered. I repeat, 12,000 cubic feet of gas per ton can be made by ordinary processes from the slack Camerton coal that is being used at Exeter; and if it has not yet been done at Exeter or Salisbury, perhaps there may be some reason for not doing it. I suppose it is fair to assume that if "Hotspur" had been on visiting terms with the "spirits of the deep," he would have taken care that they answered his summons; and if the "Hotspur" who has to manufacture coal gas is familiar with the contents of the coal, I take it that he will see that the "spirits," in the shape of gases, are *made* to issue from their hiding place. Possibly the "spirits" that will not come when called are those blackest of molecules that can just balance their own co-efficients of weight, but which are so ashamed to be called on to do 50 per cent. more than "possibility," that, much as they regret it, they have to ignore the call. Moral: Do not ask impossible things of objects animate or inanimate.

I do not agree with Mr. Humphrys referring to Parliamentary Returns, and setting his standard at 10,000 cubic feet to the ton, when he wishes to compare results of a new patent process in which he has an academic interest, and which would be better understood if direct questions were replied to in a direct manner. Surely the comparison should be made with the *best* results obtained in ordinary practice. I cannot believe that Mr. Humphrys is serious in taking such a figure. I construe his remarks as being tantamount to expressing a disbelief in a yield of 12,000 cubic feet of gas from ordinary coals. Without inquiring what coal Mr. Humphrys is using, I will venture to assert that it is more nearly capable of yielding 12,000 than 10,000 cubic feet of gas to the ton.

What has Mr. Humphrys to say:—

(1) As to his own laboratory test yielding 11,736 cubic feet to the ton; and how can he reconcile this make with his standard of 10,000 cubic feet?

(2) How does he obtain an extra 1½ cwt. of coke by carbonizing 1 cwt. of tar?

(3) What reasoning can he adduce for his claim that the working temperature of the Settle-Padfield process can be less than the ordinary process?

(4) What argument has he to support his statement that coal charged into the retort by the handful yields more gas than when charged by the scoop?

(5) What other claims can Mr. Humphrys make for the Settle-Padfield process than the carbonizing of the tar and the constant quality of the gas given off from the retorts?

All these questions were contained in my previous remarks. They have not been answered. When they are replied to scientifically, or even rationally, I will acknowledge them—not otherwise. When I first replied to Mr. Humphrys, I hoped that he

would have given us some interesting points on carbonization; and this was my sole object in entering into the question. So long as Mr. Humphrys will confine himself to carbonizing, I shall be happy to go into any point he raises; but I am not prepared to enter to the slightest degree into any other issue.

Mr. Humphrys asks me why I do not visit Exeter and see the process at work. My answer is that, from a carbonizing point of view, there is nothing new or sufficiently interesting for me to see. I have quite followed the work of the apparatus employed in the Settle-Padfield process; and I have accepted the yield of gas per ton as 13,000 cubic feet and no tar, as against 12,000 cubic feet and the usual quantity of tar, &c., with ordinary methods.

THE EASTERN COUNTIES GAS MANAGERS' ASSOCIATION AND AFFILIATION.

The members of the Eastern Counties Association at their meeting to-morrow will have before them a report by the Committee, in which they heartily approve of the proposed affiliation with the Institution of Gas Engineers, and recommend accordingly, provided—

(1) That the Association retain its title, and be known as "The Eastern Counties Gas Managers' Association, affiliated with the Institution of Gas Engineers."

(2) That the existing rules be the rules of the Association; but if the Institution object to any, the Committee will be prepared to consider any new rule or suggestion, and submit the proposal to the Association for adoption or rejection.

(3) The management of the Association to remain as at present, and its finances to remain under its own control.

(4) That the President of the Association shall be an *ex officio* member of the Council of the Institution during the term of his office, provided his qualifications entitle him to membership of the Institution

(5) That members of the Association who are qualified to become full members of the Institution be admitted without entrance fee.

(6) That in the event of the Association from any cause whatever becoming detached from the Institution, it shall revert to its existing constitution.

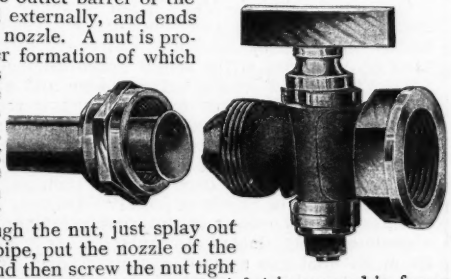
(7) That during the time the Association is affiliated with the Institution, an annual fee shall be paid by the Association, to be agreed upon.

The Committee, in making these suggestions, express the hope that the members will consider them with a view to stating their ideas on this important subject at the meeting to-morrow.

QUICK CONNECTIONS.

Ingenuity never seems to be at rest in the quest for further means of reducing the time and labour formerly expended on all sorts of work. There is before us a simple device sent by the Richmond Gas Stove and Meter Company, Limited, which has for its object the making of connections with a facility and certainty as to tightness that causes it to immediately take one's fancy. The special fittings for the making of the joints comprise the whole range used for internal work—such as main taps, stove bends, meter unions, elbows, tees, bends, &c. In fact, the little special formation necessary can be applied to any fitting that is going to be connected to compo. or lead pipes.

The sample submitted is a main-tap—known as Newton's solderless main tap—and its description will answer for the entire range. In this case the outlet barrel of the tap is threaded externally, and ends with a bevelled nozzle. A nut is provided, the inner formation of which corresponds with that of the end of the barrel of the tap. The only thing that has to be done is to push the compo. or lead pipe through the nut, just splay out the end of the pipe, put the nozzle of the fitting into it, and then screw the nut tight up on the barrel. A firm and gas-tight joint is secured in fewer minutes than it takes to tell how it is done. The illustration shows the pipe protruding through the nut; and everything ready for screwing up. The arrangement is extremely simple; no soldering is required; and, by its means, there must be a large economy effected in time and skilled labour in fitting work. To disconnect, it is only necessary to release the nut, when the pipe is found to be undamaged and ready for connecting up again when required. The fitting before us shows that it is made from the very best gun metal, and is finished in an excellent manner.



SCOTT-SNELL GAS-LAMPS ON ELECTRIC ARC COLUMNS.

The accompanying illustration is from a photograph taken of one of the main streets in Alloa, showing how high-power street-lamps of the ordinary square type can be fixed to the electric arc poles, and compete with the electric arc on its own ground. Four months since, the Town Council of Alloa, being dissatisfied with the electric arc lighting of the town, and particularly with its high cost—running to about £20 per lamp per annum—instructed their Gas Manager (Mr. J. W. Napier) to make experiments with high-power gas-lamps, to ascertain whether they were suitable for lighting the town instead of the electric arcs.

Experiments were made with two forms of intensifying lamps, but neither of them would stand the high velocity of the wind which is encountered in the Alloa district. The Scott-Snell lamps, however, being wind-proof, stood the test; and, during the months

they have been at work, they have, we learn, given absolute satisfaction. There has been no trouble whatever in managing them. The renewal of mantles has been very small; while the light given easily rivals the adjacent electric arcs, and the cost per annum is one-third of that of the electric arcs. The photograph is interesting, because, so far as we are aware, it is the first time in Scotland that electric arc lamps have been taken down and high-power gas-lamps substituted. For a long time, gas engineers have had no fear in boldly challenging electric arc lighting; and these illustrations of success, when a local authority will allow gas to show by comparison what it can do, are very encouraging to further efforts.

We regret to record the death, on Monday last week, of Mr. Joseph Ibbotson, who for 31 years was in the service of Messrs. John Wright and Co., and for the last 20 years their chief representative in the Midlands and South of England. The deceased gentleman was very widely known, and was much esteemed by the firm as well as by managers and others connected with the gas industry, many of whom, from various parts of the country, were present at the interment, which took place in Erdington Parish Churchyard on Friday. The funeral was attended by the firm's representatives from every district in the kingdom, as well as by Mr. J. Fentiman, on behalf of Messrs. Fletcher, Russell, and Co., who had on many occasions during the past 17 years been associated with deceased, especially in connection with the numerous exhibitions of gas appliances held by the two firms. Mr. Ibbotson leaves a widow, two daughters, and two sons, one of whom is Engineer and Manager of the Newport (I. of W.) Gas Company, and the other is articled pupil at the West Bromwich Gas-Works.

ANNUAL "INFORMAL" MEETING OF SCOTTISH GAS MANAGERS.

The Annual Informal Meeting of Scottish Gas Managers was held in the Grand Hotel, Glasgow, on Wednesday last. Special interest attached to the occasion, from the fact that this was the twenty-first gathering of the kind, and that, as a fitting mark of respect to Mr. JAMES M'GILCHRIST, of Dumbarton, who was the founder of the Informal Meeting, and for many years the Convener of it, that gentleman had been asked to preside. Mr. M'Gilchrist had, in turn, made special arrangements for the celebration of the "majority" of the meeting; and the result was that, when he took the chair, there was an unusually large assemblage of gas managers and their friends. There were no preliminary proceedings.

The PRESIDENT remarked that he was very pleased to take the chair on this occasion. As they all knew, it was customary at the Informal Meetings for the President's Address to be discussed; so he would read an address which he hoped would afterwards be fully debated.

PRESIDENT'S ADDRESS.

Gentlemen,—Among the many fine old customs we inherit, that of an observance of a "Coming of Age" is not likely to be allowed to pass into the realm of the forgotten, even amid the stress and turmoil of a workaday world. To us, to-day, this sentiment of linking the past with the present has a peculiar significance; for we, as an Association, have arrived at our "Majority Milestone." Our "significance" of that interesting event is taking the form of a couple of presentations, a dinner, and a dance—functions, I think, quite in keeping with the occasion.

Glancing into the past, may I say that if our Association reaches its majority without possessing assets in the shape of worldly gear, neither have we fallen behind in the race, as, if debts we have, they are only debts of gratitude to our Past-Presidents, some of whom, we reflect with sadness, have gone "for ever and ever by."

On an occasion like this, one might pardonably become historical, especially if he searched the records of our own Association. But our Presidential Addresses have always had a practical ring about them; and I do not intend to depart from precedent. I also crave your indulgence if I freely use that greatest liberty men possess—the liberty of speech.

I propose, first of all, to direct your attention to the overtures from the Institution of Gas Engineers. Since we last met, this Incorporation has outlived its first year without any serious trouble. Its President (a Scotsman, by the way) delivered an able address, well received by a large audience; but—

> "The cleanest corn that e're was dight
> Will have some pyles o' caff in't."

I consider the affiliation scheme outlined by him "caff." Consulting a dictionary, I find the word "affiliation" means "adoption" or "association in the same family." How could our National Association, having so many extraordinary members, affiliate with this amalgamated Incorporation?—an incorporation whose Council quite recently insulted most of the extraordinary members of the Gas Institute by turning them out of its membership. Surely this proposal is not another attempt to degrade this most useful class of members!

But even if the answer is in the negative, how could the North British Association affiliate? If one member is to be taken and another left, the scheme can be in no sense called affiliation.

Another "pyle" is the introduction of chairmen of gas boards to the annual meetings. When a hard-hearted Council cuts off from membership gentlemen of high standing as gas engineers—men of irreproachable character—surely it is absurd to substitute, in conference, shoe merchants, grain merchants, &c. What technical enlightenment can they give?

The Institution of Gas Engineers should carry out the work lying to its hand—not fritter away precious time on building castles in the air. When it proves itself worthy, gas engineers throughout the world will require no inducements to join its ranks; rather will they consider membership an honour.

Now I turn to some reflections on the subject of "Capital *versus* Revenue Account." In applying for situations, managers frequently refer to the reductions made in the price of gas during their term of office. They show some aptitude of forgetting, however, that the price of the raw material, together with the quality of the gas produced, may be the cause of a lower or a higher rate per 1000 cubic feet. Were they really anxious to educate the public, they would give the price per 1000 cubic feet required to pay the dividend on capital as at their coming to, and on their departure from, the works. This is important; because, in valuations, I frequently find items charged to capital which ought to be in the revenue account. In the best interest of our profession, this ought to be avoided. It is only with a low capital that we can successfully compete with our rivals. Perhaps we cannot at all times keep the capital lower per 1000 cubic feet than we found it, because in erecting (say) a gasholder we anticipate a future demand, and expend money in excess of present requirements. But I strongly recommend, when coal is cheap—as at the present time—the advisability of forming suspense accounts. In this way, managers may anticipate the re-erection of a retort-bench, the introduction of larger purifiers, or the substitution of a large for a small holder.

Before leaving this subject, permit me to state that thousands of pounds are lost annually through defective plant and apparatus. The suspense account, along with a judicious expenditure of capital, can easily transfer the loss to the other side of the balance-sheet. My counsel is: Press on extensions with all your might when coal is cheap, for when it is "booming" the prices of material and labour are augmented. Generally speaking, too, capital should not be expended on machinery which cannot reduce working costs. I have seen an Irishman with a shovel do work at half the cost of machinery.

In asking you to consider with me "Horizontal and Inclined Retorts," I may say that this most important question is engaging the attention of the Manchester District Institution; and probably, with patience, we shall gain information. As few of our members use "inclines," it might not afford much profit to discuss the merits or demerits of the question. In another Association in the South, the President lays great stress on the importance of a "dry" hydraulic main. It does not occur to me that a wet or a dry main can affect the quantity of gas made per ton of coal carbonized; but, even if it did, I strongly favour the simple water-seal, for its safety and security of working. I never believed in excessive yields per ton. Indeed, better value is frequently obtained by "striking" the retort-lids before charging-time—thus preventing the last products of the charge deteriorating the illuminating power of the gas previously extracted. The figures of Mr. George Helps, the President to whom I refer, showing large and steady makes per ton of coal carbonized, are of little value, as they only give the make per ton, without the quality and quantity of all the products.

In regard to the Settle-Padfield retort, I trust it may have a future. But we must wait for extended and practical working results before coming to any hard-and-fast conclusions. I have no experience of the various patent retorts or retort settings introduced during the thirty odd years I have been connected with the profession, save the Hislop patent settings; and these do excellently. Lately, in regular working, and with low-priced coal, a setting yielded 10,000 cubic feet of gas per ton, and 10,000 cubic feet per mouthpiece per diem.

"Regulating Condensation" is the title of my next topic. This process does not, perhaps, receive the attention its importance demands. Mr. Currie, of Alexandria, quite recently gave his experience, and spoke of the wonderful benefits to be derived from close attention to the cooling of the gas. I touch on the topic to explain a cheap and effective method of regulating the temperature in annular condensers. For many years I have, in cold weather, used a sail-cloth, fitted so as to enclose either one-half or the whole of the condensers. By fixing a block-and-tackle to the ornamental framing on top, in a few minutes the sail can be "heaved" into position, drawn "taut" around the condensers, and the temperature regulated without trouble. No doubt there are in the market excellent water condensers; but these are costly, and the water (apart from its cost) requires constant attention.

A long vexed question is that of "Lime *versus* Oxide Purification." Notwithstanding all we read about the cheapness of purification by oxide, the patent fact remains that gas is sent out impure. I hold that by oxide alone proper purification cannot be effected, and that, no matter what the illuminating power is, the gas should be freed from an excess of the sulphur compounds. Lime purification, or a combination of lime and oxide, can only accomplish this. The great objection to oxide purification is that it only removes the one form of sulphur impurity, and allows all the others to pass forward with the gas. It may be argued that lime purification costs more. But what of that? Does not the consumer, who pays, get the benefit of a purer atmosphere to live in?

Our grand old man—Mr. William Young, of Peebles—showed, many years ago, the great loss the gas sustains in the tarry matter taken up by the oxide, and how it robbed the gas, even after revivification, of the richer hydrocarbons—a loss probably greater than the difference between lime and oxide purification. Another objection to the oxide method is the stench created when exposed to the atmosphere. I cannot better illustrate the offensiveness of the odour than by repeating a statement made by the wife of an old and respected manager. "The smell," she said, "tainted the hens' eggs to such an extent that they were useless as an article of food!" Talking, seriously, gentlemen, do the supporters of the electric light not claim for it the absence of contaminated atmosphere? It is our bounden duty to purify coal gas so that consumers may have no cause for complaint; and to my mind, this cannot be accomplished without lime.

I make no apology for now proceeding to speak to you under the heading of "Tidy Work and Tidy Workmen." It is said the products of coal tar rival in beauty the tints of the rainbow. While this may be so, it is sad to observe the genuine article as exposed in many gas-works. As seen there, it is not even suitable for preserving the plant. Personally, I like to see apparatus wearing the holiday smile produced by a bright oxide paint. The "Photo Bits" of our gas-works in the South and East

that we see from time to time suggest that we, in our northern climate, could do something to sweeten the surroundings of our workmen. We cannot grow the flowers of the Sunny South, but we can, in odd corners, if we have not open squares, plant the thistle and the rose. A wall not on visiting terms with God's sunlight can always support the ivy—to me lovelier far than the painter's art.

We can also do much to raise our workmen by improving their surroundings. In several places I have introduced workmen's rooms, with baths, &c. I regret to state, however, that they do not appreciate these gifts as they ought to do. Being on intimate terms with a parish priest, in a town where the stokers are all Roman Catholics, I requested him to lecture them on the morality of cleanliness. This he promised to do; but, at the same time, the Reverend Father suggested that our retort-house men should come and go from the works in clothes different from those in which they labour—as workmen frequently do on the Continent. Could we accomplish this, it might assist in reaching Burns's ideal—

"To make a happy fireside clime
For weans and wife,
That's the true pathos and sublime
Of human life."

Loyal as we are to our profession, you will bear with me as I take up the topic of "Electricity *versus* Gas." We may take it the general public know little about the cost of the former, and believe the so-called "Light of the Future" is cheaper than gas. We know it is a costly, but formidable, competitor, and that it has come to stay. In Edinburgh and Glasgow, for years past, thousands of pounds have been spent by the authorities on public lighting by electricity. During this period, practically nothing was spent to improve the lighting of hundreds of poorly gas-lit streets. The "Second City" [Glasgow] has quite recently adopted a scheme whereby, at moderate cost, the lighting of these streets will be greatly improved. The incandescent mantle is to do the needful.

To show the enormous cost of public lighting by electricity, permit me to give you figures from the balance-sheets of

"Auld Ayr, wham ne'er a toon surpasses."

In 1895-6, the cost of public lighting was £1486 17s. 1d., made up as follows:—

Electricity	£105	0	0
Gas	829	4	6
Wages, &c.	552	12	7

In 1902-3, this charge amounted to £4792 5s., made up thus:—

Electricity	£3546	13	4
Gas	506	6	6
Wages, &c.	739	5	2

From these figures it appears that the cost of reducing the gas bill by £322 18s, has increased the burden to the ratepayers for public lighting by £3305 7s. 11d. per annum. If we allow the odd £305 7s. 11d. for extensions (which seems to me a liberal allowance), we have an increase of £3000 per annum. Is the game worth the candle? The charges are: For arc lamps £27, and for 35-candle power lamps £4 15s. each per annum.

To show that the Ayr Gas Company are still progressing, I may state that in 1896 they sold 55½ million cubic feet, and now they sell 67 million cubic feet per annum. The Company have just raised the Manager's salary by £50; and I may say they fight the Corporation's electric installation with a 25-candle power gas, sold at 3s. 1½d. per 1000 cubic feet. During the years of the Corporation management of the electrical business, a loss of fully £6000 was transferred to the police accounts. In this instance, had the Ayr Town Council been purveyors of gas, in all likelihood the poor gas consumer would have had this loss to bear.

I now pass on to speak concerning the wide subject of "The Value of Different Grades of Gas." In 1874, in a presidential address, the late Mr. William Foulis said: "If you use a gas of lower illuminating power, you must use an increased quantity to produce the same amount of light." At the same meeting, another great expert—the late Dr. Wallace—stated: "But it cannot be doubted that a supply of gas of comparatively high illuminating power is a most desirable thing, independent altogether of the consideration of cost." The former dwelt on the difficulty of reducing the standard; the latter more particularly referred to the products of combustion.

Holding the views expressed in these quotations, I read a paper entitled "Twenty-five *versus* Twenty Candle Gas" before the North British Association of Gas Managers in 1882. I then tried to prove that in Scotland, with our plentiful supply of rich gas-making material, we could give our consumers better value with higher power gas. I also mentioned that if London and Paris had had such a cheap supply, we should have heard less of the electric light. Since these days, the standard has been reduced; and now we cannot find a room or hall lit by coal gas in which to meet!

My views in regard to higher power gas are moderating as the incandescent system of lighting prospers. If we could guarantee our consumers a mantle that would live for a quarter-of-a-year, we could supply a lower quality of gas. But, as we know, many consumers have given up the use of the incandescent system on the score of cost, and have gone back to the flat-flame burner, with which they profess greater satisfaction. At present, I estimate that 66 per cent. of the gas used in Scotland for lighting is consumed through flat-flame burners, and until the mantle is such that we find the consumers preferring it in the majority, I adhere to the higher grade, as being the most economical for our best customers. The corporations and gas companies who use "sma' stuff" confer a great boon on undertakings which prefer to purchase higher-power coal, as their action prevents undue competition for this commodity.

I appreciate the fact that there are many diverse opinions of grade value. As a rule, conviction depends pretty much upon the standpoints from which the gas is valued, and these may be classified thus—

1.—The purely commercial, excellently expressed by our National Bard in the well-known couplet—

"If self the wavering balance shake,
It's rarely right adjusted."

2.—The purely scientific, with attention devoted to the suitability of the gas for the purposes to which it is to be applied. As the sage has it: "There is an eternal fitness in things."

3.—The judicious blending of Nos. 1 and 2, so as to give the consumer the best value for his money.

The first point is illustrated in several ways. For example, we have the companies who take advantage of their improvident penny-in-the-slot consumer, by charging him exorbitant rates as compared with the ordinary. The same spirit is displayed by those advocating low-grade gas. They lower the quality without proportionately reducing the price. The average consumer knows nothing about illuminating power or calorific value; all he looks at is the price per 1000 cubic feet. The purely commercial mind thus takes full advantage of the people's necessity, while its methods are in many cases illogical and inconsistent. The latest Scotch agreement—between the Stirling Gas Company and the Council of that Royal Burgh—illustrates the point. The quality of the gas is to be reduced 20 per cent. and the price 5 per cent. Where does the consumer come in here?

I know it is very difficult to come to hard-and-fast conclusions on the subject of the grading of gas. If proof of this is demanded, I can only draw you a pen picture of the "Experts at Variance." We have Sir George Livesey persistently advocating, as the light which should be supplied, a 14-candle power gas as an article which could be produced by the carbonization of native coal without adulteration. In this opinion Sir George was ably supported by Mr. W. H. Y. Webber, in his interesting lecture to the Gas Institute in 1900. Mr. Webber not only expressed a like opinion in regard to British, but also of Continental coal, used in the production of Continental gas. The strong point with both was that unadulterated gas should be sold in its highest condition as regards illuminating power.

In the same year that these views were expressed, and at a meeting of the Institution of Gas Engineers, Professor Vivian B. Lewes delivered an eloquent lecture on "Water Gas and its Recent Continental Developments." Therein were expressed very different views. The Professor's opinion was that the proper grade of gas to supply should be that produced in the carbonizing of coal, supplemented by a considerable volume of water gas made from the residual coke by the Dellwik process. The water gas is passed in among the hot products coming from the coal, to obtain some enrichment from what would otherwise go to form tar; the further enrichment required being given by carburetting with benzol. Here we have, at both ends, a breach of Sir George Livesey's and Mr. Webber's law—that of dilution and enrichment. In the concluding portion of the lecture, the Professor suggested a still further breach of Mr. Webber's rule. He outlined the innovation of modifying the carbonizing process under the protecting influence of water gas; the object being to obtain greater volume, while, at the most, only slightly reducing the illuminating power.

In a paper read before the Gas Section of the Engineering Congress at Glasgow, our learned Professor tells us that Sir George Livesey—the advocate of pure coal gas—generously gave him permission to make a trial of the suggested process, under the careful guidance of Mr. Sidney Y. Shoubridge, at the Crystal Palace District Gas-Works. Professor Lewes, explaining why the trial was made there, says:

> At the last half-yearly meeting of the South Metropolitan Gas Company, it was stated that, although the standard illuminating power had now been reduced to 14 candles, the returns from the testing-stations of the London County Council showed that the gas sent out still had an illuminating power of over 15 candles, and that this unnecessarily high-quality gas continued to be made owing to the fact that the Company's Engineers had not yet learned the conditions necessary for the economical production of the 14-candle gas. This must, of necessity, be a grave trouble wherever the change has to be made; and I hope that, in the experimental results which I have to bring before you in this paper, you will recognize a solution of the difficulty that is at once simple, practical, and economical.

Parliamentary power was sought, and obtained, to reduce the quality of the gas from 16 to 14 candles, on the ground that 16-candle gas could not be produced from the coal available, without costly enrichment—oddly enough characterized as "adulteration." Following on that, most people would expect pure coal gas would have been manufactured; but this was not so. Finding the coal produced a higher grade of gas than they were empowered to supply, the first thing the promoters of the Bill set about doing

was to experiment with carbonizing the coal under altered conditions; the deliberate intention being that of increasing the volume by diluting the coal gas with water gas.

These remarks on this absorbing subject lead me on to speak of the process of "stretching." In his paper to the Institution of Gas Engineers (in 1902), Mr. H. E. Jones shows how the difficulty regarding the high quality of gas referred to by Professor Lewes can be easily got over without adulteration. Mr. Jones says he has been considering how far coal gas can be stretched—in the sense of increasing the volume at the expense of the illuminating power. He says that with abnormally high carbonizing heats, and by diminishing the pressure in the retorts, it is possible to stretch out the gas from a ton of Durham coal so as to produce 25 per cent. more volume.

However, having thus diluted, or stretched out, the gas obtainable from the coal, he finds it is so attenuated that it cannot be photometrically tested by the ordinary standard burner, in consequence of that burner admitting more air than the attenuated gas requires to develop its lighting value. To meet this drawback, power is sought, in turn, from Parliament for the adoption of a new burner, which no one consuming the gas would adopt or benefit by. These stretching or diluting processes seem to me akin to the practice of greedy merchants who dilute our national beverage. In both cases, as you well know, it takes a much greater quantity to produce the same "illuminating effect."

Now, I put it to all concerned: What is the object of the straining after this low-grade gas? What is the prompting motive? Can this meeting enlighten me? To assist you in doing so, I may refer you to the excellent paper by Mr. A. G. Glasgow, directly bearing on the point, read before the American Gaslight Association last year. The author takes up and treats the subject from a combined commercial and scientific point of view, though he more particularly deals with the conditions obtainable in London, where the high priests of low-grade gas "live, move, and have their being." The only weak point in this able and otherwise logical paper is that it does not sufficiently recognize gas as a supplier of energy for all domestic purposes. To my mind, it gives undue weight to illumination, to the exclusion of heating value. There is no doubt that carburetted water gas has a considerably less calorific value per unit volume per candle than pure coal gas, and is consequently less efficient where used for purely heating or motive-power purposes.

Before concluding, may I be permitted to make a few remarks directly bearing upon some effects of enrichment? For years past, the great bulk of our coal gas in Scotland has been made from splint, or similar class of coal, yielding an illuminating power of 15 candles, and a calorific value of about 600 heat units per cubic foot. When such gas is enriched, by the addition of cannel, until it has an illuminating value of (say) 20 or 21 candles, its heating value jumps up to 700 heat units per cubic foot. To enrich 15-candle coal gas with benzol to the same illuminating power would require about a quarter-of-a-gallon of that liquid. But although the illuminating power would be all right, the benzol vapours only raise the heating value to about 630 heat units per cubic foot. The benzol-enriched gas, therefore, while of equal value to the consumer who uses it for illuminating purposes, loses about 10 per cent., as compared with cannel-enriched gas, when used for heating or motive power. The same remarks, although to a lesser degree, hold good with other than cannel methods of enrichment.

As the last word on this subject, I may say I am strongly convinced that the difference in the relative illuminating and heating powers, due to the varying methods and materials used to manufacture and enrich coal gas, has not received the attention it deserves; and perhaps, in this room—where there are so many gentlemen using benzol for enriching purposes—some will kindly come forward at the meeting of the North British Association of Gas Managers, and refute, in a paper, the statement I have just made.

Gentlemen, as the immortal Sam Weller said: "Them's my sentiments." I give them, more particularly where I differ from recognized authorities, with some trepidation and diffidence, but, nevertheless, with all the faith that is in me; and I trust they may be of some assistance in enlightening the judgment of the profession on the various topics dealt with.

And now I resume my seat, expressing my sense of the honour you did me in electing me to the President's chair for the second time—an especial honour in this opening year of our manhood. In returning my thanks for that compliment, may I be permitted to express the hope that our "Informal Meeting," in the words of the poet—

> "Shall firm remain
> Till Nature's handiworks decay,
> And 'chaos come again.'"

Discussion.

Mr. A. Yuill (Dundee) thought all present would agree that, in the address which had been presented to them by the President, he had come up to, and had even exceeded, the high standard they expected. The President occupied quite a unique position. He started the gathering; and he (Mr. Yuill) thought it was most fitting that he should preside over it, as he was doing so ably and so well, at this, their twenty-first anniversary meeting. He had given them some scope for thought, and a great deal of what he had said required to be carefully considered and pondered over. In fact, he did not give them much room for debate, although some of his sentiments required a little enlightenment. In speaking on the subject of "Capital *versus* Revenue," there was one point which struck him very forcibly, and one with which he had had to deal. The President said they should have a suspense account. Well, perhaps some of them who had had to go into valuations—he did not mean valuations for a transfer, but for assessment purposes—had found that the valuation of a gas-works depended on the profits made; and if they, from their profits, created a suspense account, it naturally added to the valuation of their works. Take a case—his own, for instance. Formerly they carried £4000 per annum to a suspense account. This was very convenient for meeting the charges the President had pointed out; but it had another effect of which, in a great many instances, they were conscious. The £4000 a year raised the valuation of the works £4000. He did not know how it might be with the majority, but in Dundee it practically amounted to 4s. 11d. per pound in taxes. Taking it at 5s., it was a simple calculation to ascertain what would be the sum on £4000. It was practically £1000 a year which they would be paying away in taxes for the privilege of having a contingent fund. He thought this was a point which had not received due weight when considering ways and means. On the question of "Machinery *versus* Labour," he was glad Mr. Ewing, of Greenock, was present, because he was now regarded as an authority on this vexed question, and he had no doubt he would deal with it. There was just one other point they would allow him to mention. The President spoke of the public lighting of Ayr; and certainly the figures he had given were very striking. He (Mr. Yuill) had had to deal with public lighting; and from the experience he had had, he found that the relative cost of arc lighting and incandescent gas lighting, for the same illuminating power, stood in the ratio of 2 to 3. That was to say, supposing an arc lamp cost £15 per annum, he might give the same illuminating power for £10, through incandescent or high-pressure incandescent gas-lamps. He also spoke of the difference in the value of the various grades of gas, introducing the benzol question, upon which, he had no doubt, the President would get some of the members to give the paper he suggested. With regard to carburetted water gas, he had gone into this subject of late, and he might mention, what the President had not gone into, that in comparing costs there were what might be termed collateral advantages in using carburetted water gas, such as that, instead of requiring to send their surplus coke—as a good many of them had to do during the heavy lighting season—to compete with other works where they were forced to realize for want of space, they were able to use it themselves, and were thus entirely independent of the shippers. This might have the effect of taking the coke off the market, and allowing them to get a much higher price for it. The President had gone into the question of 16 *v.* 24 candle power—the higher or the lower grade of gas; and he (Mr. Yuill) was sure there were some present who would have sufficient information to enable them to speak upon this point and enlighten the meeting.

Mr. D. Robertson (Dunoon) said the President had given them not only his views upon practical gas making, but also philosophy and poetry. He touched—he might say he bore somewhat severely—on the advocates of low-grade gas. To him, it seemed to be a very much-disputed point at the present time whether it was more profitable to use a 20-candle gas or one of a lower grade. He remembered quite well when 20-candle gas was considered to be what he might term low-grade gas. He thought the man who sent out 20-candle gas now complimented himself on giving the consumer a very good article. But it was still a disputed point whether 20 or 15 candle gas was the more profitable for him. He (Mr. Robertson) would not like to dogmatize on this point, because he had not had any experience of sending out 15-candle gas. All he would say was that when he sent out gas of less than 20-candle power, he was apt to hear about it from some of his consumers. They would ask: "What's wrong with the gas to-night?" This proved that gas consumers noticed the difference; and in so doing they could only be sensible of the fact that they were not getting so high an illuminating power as they used to obtain. This might mean that they were having to light two burners instead of one, which was simply filling two pint measures to make a quart, when one might do. The President had touched on the point of illuminating value, and had given them good proof of the worth of cannel-enriched gas, as compared with gas enriched by benzol. There was a decided difference between the two. Whereas in the one gas they had 700 heat units, in the other they had only 630. There was a very great margin there; and if a consumer were using the gas for motive power or heating purposes, he would suffer a very substantial loss in being provided with the one instead of the other, if he were paying the same price for each. This was a matter which required consideration; and he thought it would be a very profitable study for managers to take up, and to satisfy themselves as to the correctness of the President's assertions. The address was altogether out of the common; and such addresses were all the more enjoyable because one did not often get them.

Mr. W. B. M'Lusky (Perth) said he thought that they were all agreed that the address which the President had given them was worthy of a very good discussion, and perhaps some criticism. He should like to take it point by point, and have it criticized from beginning to end. He believed the general consensus of

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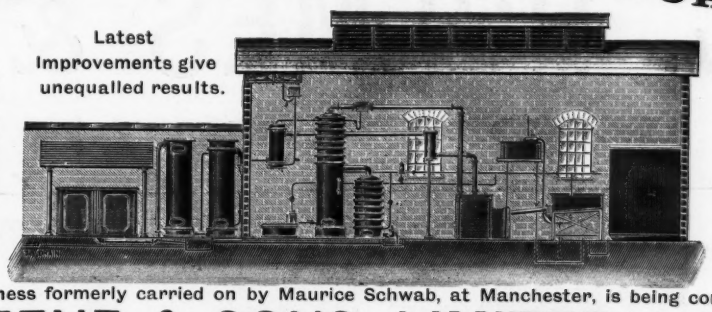

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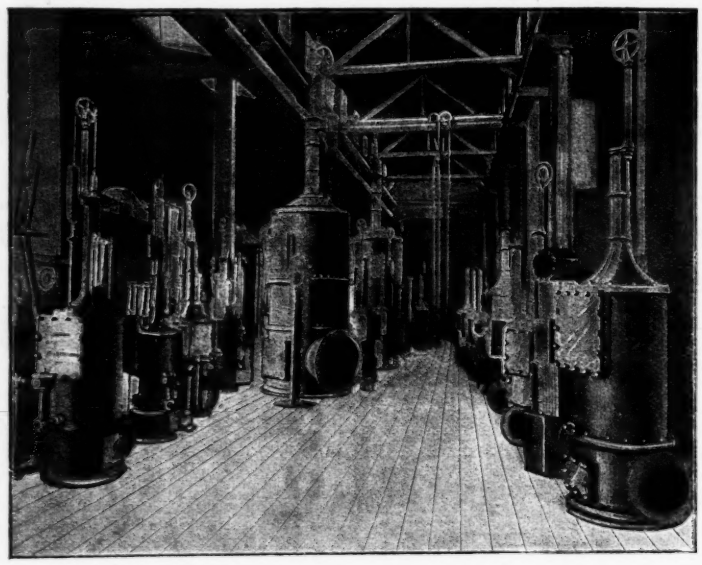

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opinion would be that the President was right, and that the gas profession, to a large extent, were wrong. But, on several points, and in a good many details, the profession were right, and he believed that some of them were wrong. With regard to the general rules laid down, the President had, in his opinion, given them advice which would be of great value, particularly in regard to capital as against revenue expenditure. The difficulty which most of them had to contend with there—he spoke of corporations—was that they were bound by Act of Parliament, and were not allowed to set aside more than a given sum each year for contingent expenses, such as the extension of a retort-bench or the erection of a gasholder, or anything which, according to the reading of the Act, could be regarded as extended works. As to main-pipes, he believed they had a great amount of latitude. In their case they could put a low value on them, and thereby increase the capacity of their mains without raising the capital account to any great extent. With respect to gas-stoves, however, they were bound to pay for new stoves out of capital; but, on the other hand, they could see that in the upkeep of these articles they charged everything possible to repairs and maintenance. In this way they had only the initial cost of the stove to place to the capital account. The workmen's time and the cost of material used in fitting could be charged to revenue. Coming to carbonizing and the machinery connected with it, he believed that the reason why machinery did not pay so well, when compared with hand labour, as it might do, was to be traced to the buoyant spirit which seemed to actuate the members of public boards when machinery had been introduced. In one case in the North, not long ago, at an election meeting, a candidate for municipal honours was asked what he was to do with the men at the gas-works when machinery was introduced. He said they would find work for the men. This gentleman was returned, and no doubt he would do his best to fulfil his promise to keep on all the men, notwithstanding that the machinery had been introduced. They would understand how difficult it was to reduce carbonizing wages and pay interest on the cost of machinery, when, on the one hand, they had to keep on the men, and on the other to make the machinery pay. In his own case, fortunately, they were not "cribbed, cabined, and confined," and machinery did pay, and paid handsomely. But, as the President had said, machinery should not be introduced without having consideration to the local conditions. It would not pay in every works and under all circumstances. Where they had works conducted in the old style, with perhaps twelve-hour shifts, and eight retorts per man, they could not do much better. But where they had eight-hour shifts, and a good living wage to every man, they would find that they would do better with machinery, provided always that there was a sufficient number of retorts to keep the machinery employed during nine months in the year. With regard to condensing, he might mention that, in his experience, the old-fashioned condenser, on the wall of a retort-house, was perhaps the best. They had an equable temperature in the house, and the natural fall of the products of condensation against the rise; they had a gentle scrubbing action, which was also a cooling action; and they had more sulphate of ammonia brought to account per ton of coal. As to the electric light, he did not think they could have a better example than the one which the President presented. In Perth they had 32-candle incandescent glow lamps, costing considerably more than the Local Authority ever anticipated; but it had been finally agreed to substitute incandescent gas for the electric lights. He should like to make a remark as to enrichment. The President referred to the enrichment of 15-candle splint coal gas to 20-candle power. He (Mr. M'Lusky) found that to do this would require 32 per cent. of first-class cannel. He mentioned this once before, and asked the question whether the advocates of high-grade gas or the manufacturers of it were the more numerous in Scotland. He believed they had more advocates than makers of such gas. If they took gas of 15-candle power, produced from splint coal, they would find they would require 33⅓ per cent. of best Newbattle or Muirkirk No. 1 cannel to raise it to 20 candles. Was there a gas manager in the West of Scotland using this quantity? Then they might see the inference of the President. They must see that some of their splints gave a higher duty than 15 candles. Some of their third-class cannels, however, did not give gas higher than 17 candles; and supposing they allowed that they did, on an average, yield 18-candle power, it would require 20 per cent. of first-class cannel coal, and the balance entirely of third-class cannel to manufacture 20-candle gas. He said again that there were not many gas-works in Scotland using four parts of third-class to one part of really first-class cannel. In the North they were really bound to supply a high-grade gas; and they had either to use a large proportion of first-class cannel or first-class shale, or find other means of enriching their gas. In his own case, benzol would not answer as an enricher from 15 to 25 candles; but he found that a first-class shale or cannel would bring a 15 or 17 candle power gas up to 20 or 22 candle power, and that benzol would do the rest, and do it very satisfactorily. But he said again that benzol would not do with wire-drawn charges; and this proved, or corroborated, what the President had said—that it was a good thing at times to strike the lids and burn the waste gases, rather than convey them away, because they were very poor carriers of anything of an illuminating nature.

Mr. A. Waddell (Dunfermline) remarked that what might be considered as the sheet-anchor of the address was the question of 20 or 25 candle gas; and he regretted very much that while, from the time the President read the address to which he had referred, the illuminating power of gas had always been going down, he had not that day pointed out how they were to keep it up. Did the President venture to think it could be done, even if they were to get coal reduced to what some might call a reasonable price? At the present time, where were they to get coal from with which to make gas of 25-candle power all round the country? They were aware, he was sure, that it was not obtainable. The late Mr. Foulis, he might say (speaking from memory, about six years ago), told Mr. Herring, the Gas Engineer of the Edinburgh Corporation, that if, in Glasgow alone, they were to ask for coal to make gas of this quality, he, in Edinburgh, would get none at all. The President had always taken up the position of being something in the way of a "standstill" in the matter of illuminating power. As to enrichment, the Young and Bell process was one which gave a gas of such a character that, both for heating and for permanency, and in every other way he knew of, it was quite equal, at any time, to the very best cannel coal gas; and yet the President did not see fit to adopt it. He referred to the matter for the purpose of pointing out that these things had enabled them to get cannel coal at a reasonable price; and therefore they had been great friends to those who wished to give good value. Of course, it was a question of value; and it was for everybody to determine whether he was to do one thing or the other. Local circumstances often determined this for him. If they took, for instance, the local conditions in Perth, would the President, in his reply, tell them what he would do under those circumstances? He had given the meeting an exceedingly able address; and if he could only solve the question of where they were to get the coal, they would be much obliged to him.

Mr. D. Vass (Airdrie) said there were many points in the address on which he must say he did not agree with the President. Take the question of a contingent fund in the case of a corporation—or his own position just now, entering upon corporation work—they would have to provide both interest and sinking-fund charges. The present generation were practically paying for the gas-works; and were they also to pay for the renewal of them, so that they would hand them over, as a present, to a generation living forty years after this? He thought that if they provided for the sinking fund as well as paid the interest, they were doing quite their share. It was, perhaps, entirely different with works in which the sinking fund had been paid for thirty or forty years, and where the works had practically been squared off. As a company, they were quite different. He thought they were then entitled, besides paying dividends, to lay aside a sufficient sum per annum to meet either depreciation or heavy capital expenditure anticipated at an early date—such, for instance, as the depreciation of holders—which they could not get out of revenue. The question of high or low grade gas was one which was solving itself, by means of the Welsbach incandescent burner. His experience within the last few years was that the annual increase of gas consumption had been suddenly checked by the rapid introduction of this or some other form of incandescent light. He should say that in his district at least two-thirds of the lights were incandescent; and he had no doubt the ratio would increase. The question of the grade of gas was purely a commercial one, because if the illuminating power were reduced, it always followed that the price was reduced also. The President had referred to the practice of using "small stuff." This, he thought, was entirely dependent on the locality of the works. While it might pay in the middle of Lanarkshire to use "smalls," he did not believe it would pay to employ the same character of material 60, or even 20, miles away from there, because of the cost of carriage. He had, for fifteen months, used oxide of iron, and no lime at all, in purification; and there had not been any increase in the sulphur compounds. He could not agree with the President that they allowed sulphur to go forward in the gas.

Mr. W. Mackie (Port Glasgow) remarked that he could not understand Mr. Vass using only oxide of iron; and he asked what was the quality of the gas he sent out.

Mr. Vass said it was 24 candles.

Mr. Mackie doubted the correctness of this statement.

Mr. T. Wilson (Coatbridge), referring to the suggestion of the President that a suspense fund might only be applicable in the case of small, non-statutory concerns, said that in Coatbridge they were under Special Acts of Parliament, and were bound to charge everything to its proper account. A suspense account would, therefore, be of no advantage to them. He had also spoken of the use of "small stuff." It was gratifying to know that, in using this material, they were also helping their neighbours by keeping down the price of coal. With regard to enriching by benzol, he used nothing but "small stuff" and benzol, and he had certainly found it a very great advantage. Being restricted as to price, quality, dividends, and so forth, the consumers in their case must get a benefit. He was delighted to find that the President was becoming modern, and was beginning to see that a low-grade gas was better and cheaper, after all, than giving 25-candle gas. If they were all supplying gas of this quality, they would have to pay a different price for their material from that which they paid at present. Mr. Vass said he purified with oxide only. He (Mr. Wilson) did the same; but he might explain that Scotch coal did not contain the amount of sulphur which was found in North of England coal. He had a very go-ahead Board of

Directors at Coatbridge; and the moment they found machinery to be cheaper than hand labour he was certain they would adopt it. He was anxiously waiting to hear what Mr. Ewing had to say upon this question.

Mr. W. Ewing (Greenock) said the President remarked that he had seen an Irishman do labour at half the cost of machinery. He (Mr. Ewing) had seen and done the same. He was a great advocate of machinery, where they could put it in to suit the circumstances. Sometimes it was misapplied; and in Scotland they had the disadvantage of having a big variance between their maximum and minimum output. In his own case, the difference was fully 80 per cent. In a case like this, it was utterly impossible for machinery to pay during a great portion of the year. In the summer they got along comfortably with about 30 retorts; in the winter, under ordinary conditions, about 180 would be their requirement. Of course, to work a large installation of machinery, costing some thousands of pounds, during the summer, making due provision for everything, would be out of place; and the cost would be at least four or five times more (taking into consideration their daily cost, repairs, maintenance, sinking fund charges, and other requirements) than during the winter. In some places in England, the variance was only about 50 per cent.; while in others there was scarcely any at all—the make was about equal during the whole year. Where machinery could be applied to (say) about 150 or 250 retorts, it was quite possible to make it pay throughout the year. There were many little drawbacks to machinery such as power stoking machinery, which, in his case, were due to local considerations. It was very wet about Greenock, and they had to use the coal as it came in. Of course, the pulverizing effect of their coal-breakers had a tendency to make the coal into mortar; and it lay dead in the retorts, with a consequent effect on the make per ton, which was a very important item, and, in itself, neutralized, in their case, the good effects of machinery. They had now on the market a machine capable of being applied to very small works—one which could be used with economy and efficiency for an installation of 50 retorts. It was the De Brouwer coal projector. He had for days watched it in operation; and he could assure the meeting it was the only machine on the market which imitated hand charging. The charges were even, and were equally carbonized. An installation could be put in at trifling cost compared with any other stoking machinery. The drawback to the machine at the present time was the disadvantage of not having a discharger; but this was a matter which would shortly be overcome. The carbonizing charges, working about a hundred retorts, would be from 6d. to 8d. per ton of coal carbonized. At Derby the results obtained were really marvellous. There was an increased make of gas per ton of coal, as compared with hand labour. It was the first time this had ever been accomplished. The cost of carbonizing, including an ample allowance for sinking fund, repairs, maintenance, and other details, he understood ran at present to about 1s. 3½d. on 96 retorts; and the work would be done with ease, economy, and efficiency. The President had mentioned that he had only had experience with one class of patent regenerative retort-setting—Hislop's. He (Mr. Ewing) knew that setting thoroughly, and was of opinion that there was not one now in the market which excelled it. With it, they could get 10,000 cubic feet of gas per ton from ordinary soft coal, and sell 10 cwt. of coke. Reference had been made to incandescent gas lighting. This was a matter which had not secured so much attention in Scotland as cooking and heating by gas, although the latter had not received the consideration they should have done. Incandescent lighting often got a bad character in houses where the burners were badly used or improperly fitted; and he thought corporations and gas companies ought to go a step farther than they had done, and supply burners free of charge to consumers, providing mantles at cost price. He had advocated this for years. It would solve the problem of incandescent gas lighting, and allow them to come to the ideal condition which prevailed over the Border—the supplying of low-grade gas. He had always been an advocate of this gas, because to enrich gas even by one candle cost 1d. per 1000 cubic feet; while with benzol it cost ½d. If they used a coal to give about 15-candle gas, to be employed in incandescent lighting, they required no better, as it was suitable for lighting, heating, and cooking. If they were to send out a staff of thoroughly qualified gas-fitters, having a technical knowledge of gas lighting, he thought there would be an even greater advance in incandescent gas lighting than there had hitherto been.

Mr. W. Currie (Alexandria) thought the advocates of low-grade gas were to be congratulated on the remark in the President's Address when he said that his views in regard to higher-power gas were moderating. He came from a district that was within the sphere of influence of the President; and they were all high-grade men down there. But he must say that he had been converted to the low-grade quality of gas, and in this way: They had been very much troubled in the Vale of Leven by the owners of a works insisting on having a gas of not less than 24-candle power; and not only this, but they saw that they had it. He did not know where the President got coal from with which to make 24-candle gas, because, for a good many winters, he had experienced great difficulty indeed in getting a gas of 24 candles, until he introduced benzol. Since then his experience had been exactly as was stated by Mr. M'Lusky. He found that, with a splint coal, yielding 15-candle gas, it was almost impossible to give the required quality with benzol; and so he still used a mixture of cannel, and enriched 2 or 3 candles with benzol. He was pleased to say that since doing this he had had very little trouble in regard to the illuminating power of his gas. He might add that the very same Company who had troubled them so much in the matter of keeping up the quality had recently put up a very large installation of Mond gas, he supposed with a view to providing electrical energy, and also, he presumed, for lighting purposes. So that they had insisted on having a good quality of gas, and had then turned round and introduced gas of very low quality, for the purpose, he supposed, of getting light and power. Then another aspect of low-grade gas presented itself in a conversation he had with the manager of a calico-printing works—a different firm from the one he had referred to. This gentleman drew his attention to the fact that they had introduced incandescent gas lighting for their printing-machines, and he said it was a very great advantage indeed—that, in fact, they could distinguish colours by the light very much better than they could with that given by the old flat-flame burners. He finished up by saying: "We do not care now what quality of gas you give us, provided you make it cheap." This was what he was now setting himself to do.

The President, in closing the discussion, said he had never made any reference to his experience at Dumbarton, save in connection with the condensers; so that he was above anything like some of the insinuations that had been made. He spoke on the question of principle; and if it were wrong in one place, it would be wrong in another unless different conditions obtained. As to the suspense account, he did not know that any Act of Parliament prevented a certain sum being set aside for plant which, in the opinion of the engineer, was deteriorating to such an extent that it would require to be renewed in (say) two or three years. It was rather a serious matter to debit the whole cost of renewing such a thing as a retort-bench in one year; and the only way to get out of this was, he thought, by forming a suspense account. There was no trouble in connection with such an account, if the object for which it was created was stated. Mr. Yuill spoke of carburetted water gas; and they all knew that it was one of the great points in favour of this gas that they could utilize their own coke, whereas in enriching by benzol, if it was one of the cheaper classes of "small stuff" that they employed, if they could not sell the coke they had, they could (as a company he knew did) sell the surplus, and this would go in opposition to all their neighbours. On the other hand, if carburetted water gas were used, there would be no question of punishing their neighbours at all. And then, might he not suggest to users of benzol that there were millions of tons of high-quality cannels and shales by which they could raise the illuminating power of their gas to whatever they pleased. He was astonished to hear Mr. Waddell speaking about "small stuff." Why, in Dumbarton, he used a coal which was brought from Fife, actually past Mr. Waddell's very own door—a good and cheap coal, and very useful in maintaining a high illuminating power of gas.

Mr. Waddell: What quality of gas do you make?

The President replied that he did not think this pertained to the matter. As to Mr. Robertson's views on 20 *versus* 15 candle gas, he said they were just coming back to what Mr. Foulis said so long ago as 1874—that, if they made a low-quality gas, they must use a greater quantity of it to give the same illuminating power. Some said they were glad that he had changed his views on this matter; but there was no alteration in his views so far as flat-flame burning was concerned. It was simply this—that they were indebted to the Professor who introduced that wonderful mantle; and if the time were come (which he hoped was near at hand) that they had a mantle which would stand, he said there would be no occasion for keeping up the illuminating power. But they had not got such a mantle yet; therefore he said they should maintain their lighting power. With regard to calorific power, he was very pleased that no one had attempted to dispute his statement that high-quality gas had a richer calorific value when made from cannel than when derived from benzol. To answer Mr. M'Lusky, he would require to go through most of the address; and he thought that his friend was right when he said they could do a great deal under the head of maintenance. He knew different works throughout the country, where they were raising an enormous capital account, which they would never get the better of. Of course, if the managers in these places were to obtain other appointments, it would be their successors who would get the baby to hold; and it was a very cruel thing indeed to the present and future consumers of gas in the towns to which he was referring. Mr. M'Lusky made a good point against carbonizing plant. They all knew that if machinery was introduced, it was with the object of reducing the number of men to be employed; but if conveners or gas committees preferred to keep the men on, no benefit could be derived from the machinery. But what he particularly mentioned in his address was that sometimes machinery was put in to do work which men could do far more cheaply. He had seen this himself. There was simply a craze for machinery; but it could not be of any use unless to reduce cost. Mr. M'Lusky had referred to the condenser. There were different ways of condensing; but he (the President) preferred to have as much of the condensing power as possible within the retort-house, so that the gas would be gradually cooled. The trouble, on a cold winter's day, was to maintain the temperature of the gas previous to scrubbing; and what he referred to was the difficulty of maintaining the temperature outside the retort-

house. Mr. M'Lusky's remarks with regard to enrichment were very much on the same lines as what he (the President) had submitted before. He, however, thought Mr. M'Lusky would do good to limit the shale; and possibly, by reducing the quantity of coke which he had to sell, he might get a better price for it, because he found that it was cheaper to use splint or cannel coal of no value for coke, in order to get a good price for the coke he manufactured. In a district so near to Glasgow, it was difficult to get a good price for coke, because it was supplied from Glasgow at a very low figure. He was very pleased indeed to hear that Mr. M'Lusky approved of striking the lids before the charge was exhausted. He thought this was one of the ways by which they could keep up the illuminating power of the gas. Mr. Waddell said this was going down. His remark upon that was that incandescent gas lighting was the cause of it. Mr. Waddell also wished to know where they were to get the material from to make a high-grade gas. He (the President) had already said there was plenty of coal to be had; and by using it they would not, of course, require to "stretch" the gas. Mr. Vass had a strong objection to having anything set aside for a suspense account other than the sinking fund. Well, in a number of cases he (Mr. M'Gilchrist) had to deal with, this fund was not sufficient for the purpose referred to. He was pleased to think that Mr. Vass had been so successful that some two-thirds of the gas in Airdrie was consumed on the incandescent system. His own experience was the very reverse; the two-thirds were flat-flame burners. Mr. Vass entirely agreed with him when he said that the illuminating power of gas was always reduced proportionately to the price; and if this were so, there was no cause for complaint. Here was what Mr. Glasgow, the eminent gas engineer, said: "A reduction in the cost of gas, when its quality (calorific and illuminating) is maintained, is an unqualified saving; but any method of 'cheapening' gas, by reducing its quality, needs to be carefully weighed, in order to discover if the real result be gain or loss."* He (Mr. M'Gilchrist) had cited the case of Stirling, where the illuminating power was to be reduced 20 per cent. and the price only 5 per cent. He pitied the gas consumers in Airdrie and Coatbridge, because they had to consume gas that was purified by oxide of iron alone. He considered it was a great waste of money to think the illuminating power of the gas produced was not supplied to the consumer, by the carbonic acid not being taken out. A small quantity of lime would put them right, and improve the luminosity of the gas. He quite approved of what Mr. Mackie said about the illuminating power. As to machinery, Mr. Ewing hit the mark right off when he said that unless machinery could do the work easily, economically, and efficiently, there was no occasion for employing it—that was to say, always having regard to the cost being less than hand labour. Personally he had never used Hislop's settings of retorts; but he had put them into many works, and the results were those obtained by gentlemen present. A great deal had been said about incandescent lighting; but he would ask his audience to consider this aspect of the question—that a bad mantle was a horrid and a ruinous thing in any place. This matter would be all right if it had the attention Mr. Ewing had spoken of—fitters going from door to door, attending to the mantles. He believed they would then have satisfaction in regard to the lighting. But at present there were so many people careless with flat-flame burners that it was beyond their power to arrange the incandescent mantle as it ought to be. With regard to Mr. Currie's remarks as to the firm who had put in Mond gas plant, he might say they had not gone in for this gas for lighting, but for power purposes. What they were coming to, if the reduction of the illuminating power continued, was this—that it would not be a question of manufacturing gas in retorts at all. In his opinion, it would in future be a question of some arrangement of the Mond or Dellwik system, or a combination of both, or perhaps something in the nature of the blast-furnace; and the size of the pipes that would be required to convey the product would be such that there would be scarcely a street in the country wide enough to take them in. In conclusion, he said he was very pleased that there had been so large an attendance, and that they had had such a good discussion. If he had not maintained a high illuminating power, there would have been no occasion for them to speak of the low one. There must be the two sides to every question before they could have a discussion. He thanked them all for it. Perhaps the gentleman who was to be appointed to occupy the chair next year would take the other side of the question, and then they would have it debated.

Concluding Business.

Mr. Yuill nominated Mr. J. Napier Myers, of Saltcoats, for the President of next year's meeting.

Mr. T. Wilson seconded the nomination; and it was accepted.

Mr. Myers intimated his acceptance of office.

The President said they were aware that Mr. Yuill had been called to a higher sphere, and his time was now so much occupied with his new duties that he wished to be relieved of the convenership of the meeting. He had great pleasure, therefore, in suggesting that Mr. M'Lusky, of Perth, be appointed Convener.

Mr. R. S. Carlow (Perth) seconded the proposition, which was adopted.

Mr. M'Lusky returned thanks for his appointment.

* See "Journal," Vol. LXXXIV., p. 221.

Mr. Ewing proposed a hearty vote of thanks to the President which was unanimously accorded.

The President having acknowledged the vote, the meeting terminated.

The Dinner and Reception.

A very large party of ladies and gentlemen subsequently sat down to dinner in the hotel—Mr. M'Gilchrist in the chair.

The Chairman, in the course of the after-dinner proceedings, said Mr. Yuill had served as Convener of the Informal Meeting for seven years; and on his leaving office there was a general desire on the part of his colleagues that something should be done in the way of a presentation to him. He could assure them that it gave him genuine pleasure to hand to Mr. and Mrs. Yuill the articles which were on the table.

The articles referred to consisted of a drawing-room clock with side ornaments, and an antique silver dessert-stand or centre epergne, with five round cut-glass dishes, and four silver fruit-dishes in rich scroll work. On each set of articles there was the following inscription: "Informal Meeting of Gas Managers. Presented to Mr. and Mrs. Yuill, 13th April, 1904."

Mr. Yuill briefly returned thanks for the gifts. While, he said, he and Mrs. Yuill greatly appreci..ted the value of the presentations which had been made to them, he felt that he could not find words in which to express his feelings.

Later in the evening, Mr. and Mrs. M'Gilchrist held an "At Home" in the hotel, which proved to be a brilliant assemblage; the number attending being upwards of two hundred. Dancing was subsequently enjoyed for several hours; and many happy reunions were made.

Masonic.—At the meeting of the Hornsey Lodge (No. 890) which took place last Tuesday at the Hotel Cecil, Bro. Ernest W. Drew, of the firm of Messrs. Wood, Drew, and Co., was installed as W.M.

Increase in the Price of Thorium.—A message received at the close of last week from an authoritative source informed us that the price of thorium had been advanced by 10s. per kilo. This makes the cost now one which must be seriously affecting the expense of mantle production.

Eastern Counties Gas Managers' Association.—According to the programme issued by the Hon. Secretary (Mr. T. A. Guyatt) for the 31st annual general meeting of the Association, to be held at Peterborough to-morrow, under the presidency of Mr. J. H. Troughton, the following papers will be read and discussed: "Artificial Lighting, from the Earliest Times up to, and including, the Introduction and Use of Gas," by Mr. R. Dawbarn, of Wisbech; "Some Thoughts on the Regulation of Pressure," by Mr. T. Glover, of Norwich; and "An Experience with a Leaky Gasholder Tank," by Mr. J. S. Dougall, of Boston. The business will include the annual report and accounts, the election of officers for the ensuing twelve months, and the discussion of the affiliation question on a recommendation favourable to the proposal which will be submitted by the Committee. At the close of the meeting the members will visit the Park, and afterwards dine together at the Grand Hotel.

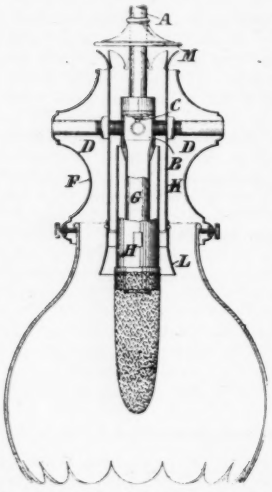
Gas-Engines Worked with Carburetted Air.—We learn from the "Ironmonger" that a Sheffield firm have succeeded in bringing to a practical success an oil-gas carburettor which renders it possible to run a gas-engine with paraffin oil such as is used in lamps, or even with commoner oils. The principle of the apparatus is that a volume of air, minutely divided, and split up into small streams, is drawn through hot oil by the suction of the engine. It is found that the comparatively low temperature of about 240° Fahr. gives perfect results; the air in passing through the oil becoming carburetted, and forming a rich gas mixed with air. By adjusting the gas and the air exactly as in the gas-engine, a proper mixture can be obtained, and perfect combustion takes place in the cylinder. It is claimed that 1 brake horse power per hour can be obtained from 0·53 pint of oil on a small engine; the proportionate consumption on larger sizes being less. The apparatus consists of a vessel occupying about 2 feet of ground space, and is not more than 2 feet high. There is also an oil-tank. It can be attached to any make of gas-engine.

The Slip of Pumping-Engines.—The "Engineering Record" recently referred to this subject, in connection with some tests made at one of the small pumping-stations along the line of the Brooklyn (N.Y.) aqueduct. These stations were built to pump water from driven wells, and thus eke out the limited supply of surface water. Naturally the pumps are worn somewhat more than would be the case with water having less solid matter in suspension; and it is hardly surprising that the slip was found to be about 22 per cent. The actual amount is not particularly important; but the fact that it is large deserves, our contemporary thinks, the thoughtful attention of many managers of water-works. The reports of pumping-station operations of many works are made out on the basis of the plunger displacement, without any allowance for slip. With such figures for the quantity of water supplied to a community, and with (say) only half the service-pipes metered, the amount of water unaccounted for reaches a large proportion of the total. It is pointed out that the means for measuring the discharge of pipes are now so varied and cheap, that there is no excuse for failure to know what the pumps are actually delivering and the mains discharging.

REGISTER OF PATENTS.

Inverted Incandescent Gas-Lamp.—Bartlett, J., of Camberwell, S.E. No. 7187; March 27, 1903.

In this inverted incandescent gas-lamp, the air and gas are separately heated before entering the mixing-chamber of the bunsen burner, and the mixture of gas and air is also highly heated before it issues at the mouth of the burner.



As shown, the lamp is suspended from a gas-supply pipe A, to which is affixed a chamber B, into which the gas issues through a nozzle C and mixes with the air entering by the pipes D (of which there may be any suitable number) from the outside of the lamp-casing F. To the chamber B is screwed a tube G, constituting the bunsen burner; the gas and air issuing from the bottom of this tube forming a long flame projecting downwards when ignited. Surrounding the tube G is an outer tube H, open at the top and bottom; and to the lower part of this tube a mantle is attached. The burner and tube H is surrounded by another tube K, of greater diameter, which is supported by the air-supply pipes D. The bottom of the outer tube has a funnel-mouthed tube L fixed thereto by bayonet catches; the tube K being open at the top and having a deflecting plate M, carried by the gas-supply pipe, serving to distribute the products of combustion issuing from the lamp. The air-supply pipes D also serve to support the outer ornamental casing F, to which can be attached a globe.

When the lamp is ignited, the hot products of combustion ascend the tube H from the inside of the mantle, serving to heat the outside of the burner-tube G, and the mixture of gas and air contained therein, and then escape at the top, where they mix with the products of combustion from the outside of the mantle which ascend the tube K. These products of combustion, being at a very high temperature, impinge upon the air-supply pipes D, which extend across the tube K, heating the air passing through them before it enters the chamber B to mix with the gas. They also impinge upon the gas-supply pipe A, whereby the gas supply is also heated.

Coin-Freed Gas-Meters.—Anderson, J., of Edinburgh, and Mackay, J., of Bradford. No. 7975; April 6, 1903.

This invention relates to coin-freed mechanism for gas-meters of the type described in patent No. 26,369 of 1897, and has for its object the simplification of the gear there described. Apart from the general re-arrangements and combinations of parts hereafter described, the present proposal consists: (1) In forming the reciprocating screw which operates the valve and slot-closer with a slotted extension which, by means of the coin, is adapted to be locked to the handle on the outside of the meter, and (2) in a new form of friction bush having a spring wire, the tension of which can be adjusted.

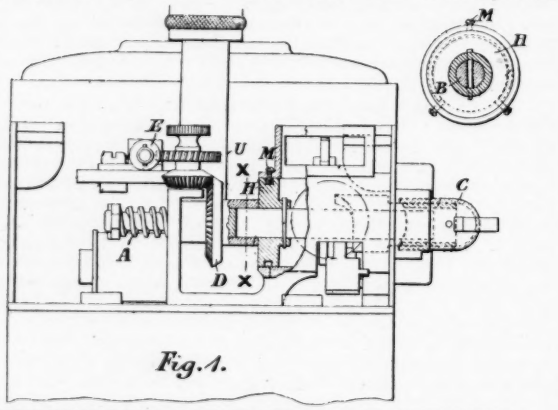


Fig. 1.

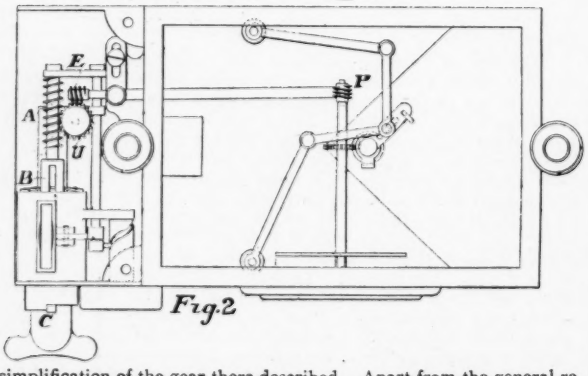


Fig. 2.

The illustrations show (fig. 1) an elevation, partly in section, of the improved mechanism according to one form; also a section of the friction bush taken on the line X. There is, further (fig. 2), a plan of a modified form.

According to the arrangement shown in fig. 1, the slotted sleeve is dispensed with, which drives the reciprocating screw through pins engaging with the slot and which enters the coin-barrel (see patent No. 26,369 of 1897), and instead there is formed on this reciprocating screw A a slotted extension B, passing within the coin-chamber. The coin inserted serves to lock this reciprocating screw to the handle C on the outside of the meter by means of the device shown in dotted lines. An internal sleeve secured to the handle boss is formed at its inner end with a projecting arm; and when the coin is inserted, it passes behind the arm and down into the slot formed in the extension B. The handle is then turned, and the coin causes the simultaneous turning, and thereby horizontal traversing, movement of the extension B through the medium of the arm. The reciprocating screw gears, as before, with an internally threaded bevel wheel D, which serves as the nut when the gear is being operated by hand—a worm E in the train leading from the meter preventing this nut from turning.

With regard to the friction arrangements—to prevent the reciprocating screw A turning when the flow of the gas is operating the mechanism, and to prevent accidental movement of the mechanism—the spring and nut previously adopted are dispensed with, and in one end of the coin-chamber a bush is provided taking the form of an annular disc H. In the rim of this disc a groove is cut, in which is inserted a piece of spring wire passing round the greater part of the disc; the two ends of the wire being restrained by pinching screws passing through the wall of the coin-chamber. A third screw M, preferably placed at the top of the coin-chamber, serves to adjust the tension of the wire, and thus regulate the friction. The disc has formed on one face a projecting collar, through which a pin passes—the pin also passing through the slot in the extension of the reciprocating screw. It will thus be seen that the screw and disc revolve together, while at the same time the screw is capable of longitudinal movement.

According to the modification (fig. 2), the mechanism is still further simplified by substituting spur gearing (or worm gearing) P in the meter-head for the bevel wheels D, mentioned above. The reciprocating screw in this case gears with a worm-wheel, formed on a sleeve, turning on a vertical arbor fixed to the base block. To the top of this sleeve, the wheel U, for changing the price of gas, is secured (see also fig. 1); this wheel gearing direct with the worm connection E from the meter. This arrangement has the advantage that the sleeve may be easily removed and fitted with a new change-wheel, or a whole set of interchangeable sleeves, ready fitted with different change-wheels, may be provided. In this modification, the reciprocating screw acts as a screw only when being operated through the medium of the coin; the action of the gas flowing through the meter serving to return it as a rack.

Street-Lamps.—Cuttell, T. L., of Bramley, near Leeds, and the Anti-Vibration Incandescent Lighting Company, Limited. No. 11,094; May 15, 1903.

This invention has particular reference to the means employed for attaching the lamp or lantern to the frog of the lamp post or pillar. The patentees propose to connect all the stay-rods directly to the lugs of the lamp bottom without leaving any projecting bolts ends, and the fixing lugs are extended so that their attaching bolts are entirely independent of the angle bars or rods of the lamp. In connecting the lantern to the frog, the bolts of the projecting lugs are passed through holes provided in the frog arms, when the parts are connected by means of nuts, so that the strain comes on the lugs themselves and not on the parts composing the lantern.

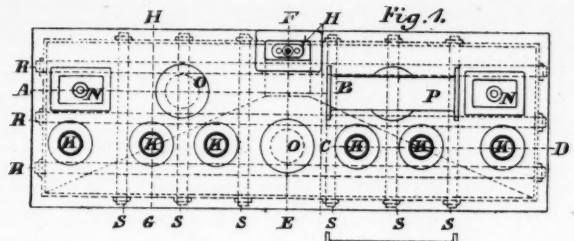
Purification of Gas.—Good, R., of Croydon, and Spencer, S., of Great St. Thomas Apostle, E.C. No. 23,045; Oct. 24, 1903.

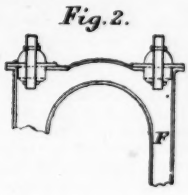
The patentees' object is "the purification of crude coal gas by its passage through apparatus consisting of an improved hydraulic main in combination with an improved hot battery condensing tar extracting washer, or by the employment of either of these portions of apparatus."

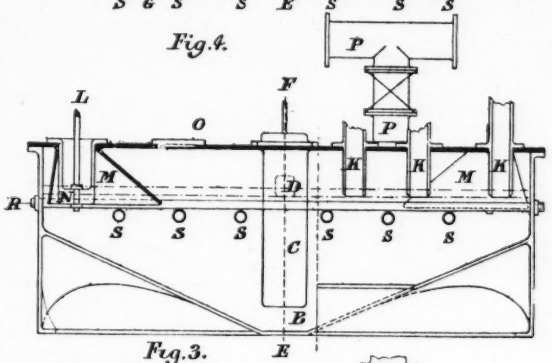
The form of hydraulic main is as described in patent No. 7258 of 1886. Through this main longitudinally and transversely there are fixed, in horizontal tiers, as many condensing pipes as may be convenient, communicating at either end with the outer atmosphere; their purpose being to induce the more rapid condensation of the hot crude gas as it reaches the hydraulic main from the retorts. Within this main, and against its side, is formed a vertical passage communicating with the lowest point—the tar and liquor freely rising up this passage and flowing over a slide or sluice valve placed outside the main, and capable of regulation within any desired limits. Between the upper end of this passage and the underside of the cover of the main, there is a space of (approximately) 3 inches, for the free passage of gas, with the tar and liquor, over the slide or sluice valve into a pipe communicating with the next section of the hydraulic main. The tar is thus maintained in a fluid state. Within the vertical passage is fitted a plug or plunger capable of free working, for the purpose of agitating, and at any time when required securing the free passage of, the fluid tar over the sluice.

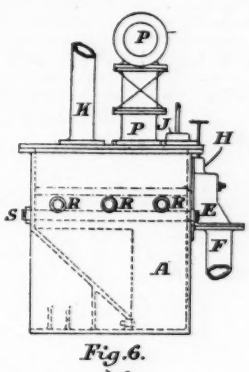
The principal pipe for passing the gas from one section of the main to the next is placed preferably vertically in the cover; and a valve or tap between the pipe and a tee in the principal gas-pipe communicating with other hydraulic mains enables any one (as desired) to be shut off without interfering with the production of gas.

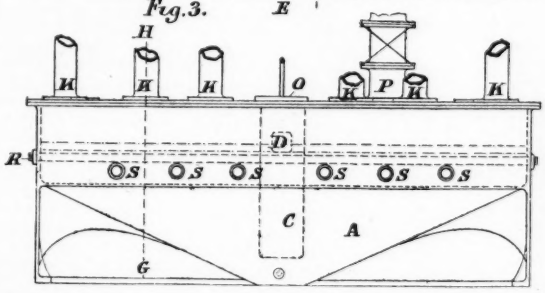
The partially purified gas passing from this hydraulic main to the hot battery condensing tar extracting and cooling washer "is dealt with by it in a manner to answer all purposes up to the inlet of the purifier." The washer referred to is that described in patent No. 2317 of 1881, and consists of a series of chambers or tanks, by preference

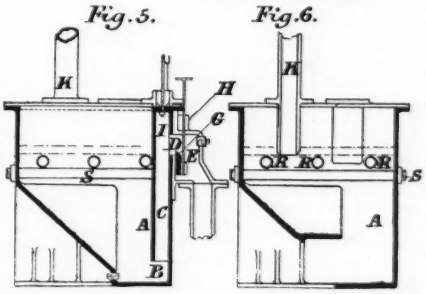






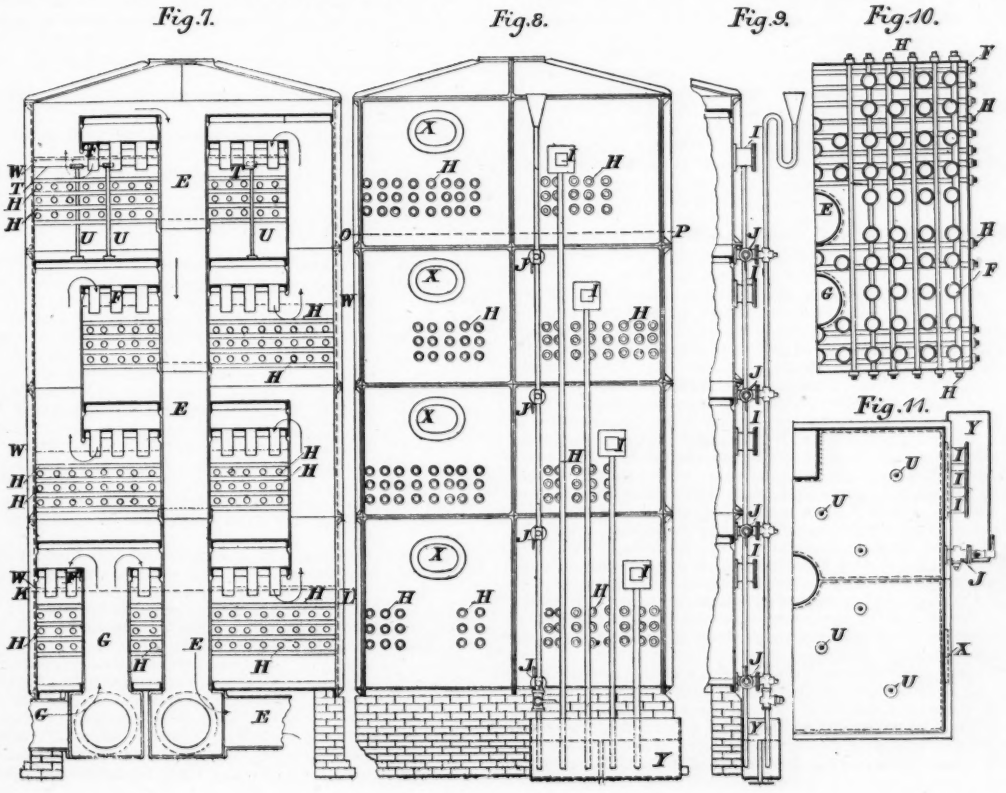






rectangular, placed one above the other. Assuming a washer consisting of four of these tanks, which are preferably of cast iron-plates, the inlet from the hydraulic main and outlet to the purifiers enter respectively at the side and from the centre of the bottom plate of the lowest tank. Each chamber, at about 6 inches from its upper edge, is covered, excepting at the inlet on one side; the outlet to the next succeeding chamber above it, and the before-mentioned central outlet, with a plate containing numerous orifices, each receiving a dip pipe. Through these pass the gas to be washed under a water seal in the chamber of about 3 inches, and so on in succession, into the two (in this instance) corresponding chambers above the lower chamber. The outlet from the fourth or upper chamber, which contains pure water and on its surface a depth of about an inch of oil, a perforated plate or plates, intervening as described below, is in direct communication with the central vertical outlet for the washed gas previously described. At the surface of the water in the case of this upper chamber or tank plates are fixed, over which the oil, approximately an inch in depth, is floated. Perforations in this plate correspond with those in the plate above it; the gas dip pipes in this instance passing through both plates and through the oil into the water below.

To affect the condensation of the gas, the four sides of these four chambers or tanks are perforated; and into these perforations are fitted ranges of condensing tubes passing horizontally through them at right angles and open at both ends to the outer atmosphere, and as



many of such ranges as it may be convenient to place in each tank or chamber.

To enable the temperature to be controlled, the condensing tubes throughout are open to the atmosphere; but any of them may be closed at either or both ends.

At a point sufficiently near the bottom of each chamber to admit of all the liquor in any of them being withdrawn, valves or taps are placed, all of which are connected with one vertical pipe outside the group of chambers, and forming a general outlet. This vertical pipe, being open at its upper end, bent to form a seal, and provided with a funnel-shaped mouth in conjunction with the taps, enables any chamber to be refilled at will; and, similarly, the liquor may be passed from any upper to any lower chamber. Each chamber is provided at the water level with a glazed inspection opening, and, at a convenient position, with a manhole and cover. In the chambers in succession from No. 1, the lowest, to No 4, the highest, the liquor would be worked approximately as follows:—

No. 1 from 16 to 20 oz.:
,, 2 ,, 10 to 12 ,,
,, 3 to about 6 oz.:
,, 4 pure water.

Figs. 1 to 6 illustrate that portion of the invention for the purification of coal gas which is contained in the hydraulic main. Fig. 1 is a plan; fig. 2, an end elevation; fig. 3, a longitudinal elevation; fig. 4, longitudinal sections on the lines A B and C D of fig. 1. Fig. 5 is a transverse section on the line E F of fig. 4; and fig. 6 is a transverse section on the line G H of fig. 1.

A is the body of the main, and B the opening formed through the bottom of the back at its centre. C is the passage rising in rear of the back from the opening B. D is an overflow outlet from the upper part of this passage into a receptacle E, from which the overflowing tar passes into the tar outlet pipe F. G is the sliding valve or sluice capable of being raised or lowered by the rod passing through a stuffing-box H from the receptacle E. I is a plunger carried by a rod which passes out from the top of the passage C through a stuffing-box J. This rod may either be drawn up into the position shown in fig. 5, or it may be employed when required to agitate the tar in the passage C. K indicates the gas dip pipes leading the gas from the retorts into the main. L are inspection openings within seal-boxes M, which descend into the liquid in the main about an inch deeper than the gas dip pipes. N indicates the plugs with which the openings are fitted in the usual manner. Provision is made for a gas outlet pipe being fitted to any of the three openings O; and a pipe P is shown fitted to one of these openings. The main is of sufficient depth to admit of two ranges of condensing pipes; three of these pipes R (forming one of the ranges) passing longitudinally through the main, and the second range S, of six pipes, passing transversely through the main.

Fig. 7 is a vertical section through the hot battery condensing tar extracting and cooling washer, showing the inlet and outlet mains, condensing tubes, and dip pipes. Fig. 8 is a front elevation of same. Fig. 9 is a part vertical section showing the pipe with (in this instance) four valves or taps permitting of liquor from any, or all, of the chambers being withdrawn, and showing also the respective overflows from the chambers. Fig. 10 is a sectional half plan on the line K L of fig. 7 through the series of dip pipes in the lower chamber, and showing the condensing pipes in ranges at right angles below them. Fig. 11 is a sectional half plan through the upper chamber on the line O P of Fig. 8, showing the inlet from this chamber communicating directly with the central outlet main, the columns supporting the perforated plate referred to above, the provision for overflows, and for withdrawing the liquor from the respective chambers.

Referring to fig. 7, G is the inlet main, E the corresponding outlet main, and W the water level in the respective chambers intersected by the dip pipes F. H are the condensing pipes; I, the overflows from the respective chambers; and J, the valves or taps for withdrawing liquor from the four chambers. T (fig. 7) is the perforated plate in the upper chamber supported by the columns U. In figs. 8 and 11, X are the manhole lids, and Y the tank for the down pipes and leading to tar-well.

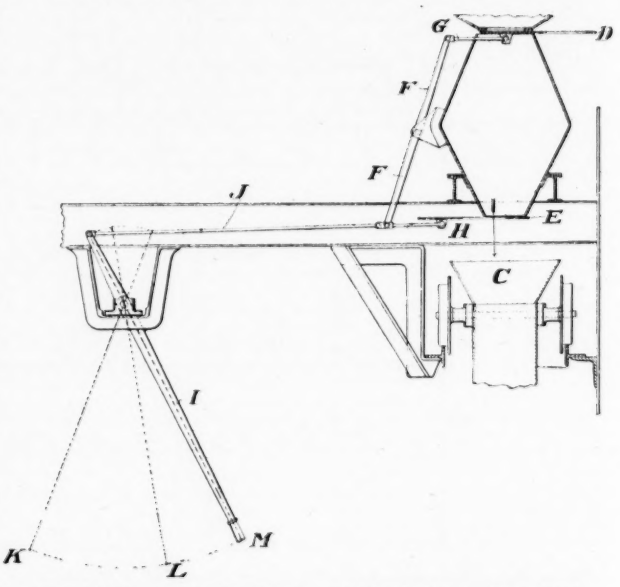
Feeding Appliances for Inclined Retorts.—Little, A. J. S. B., of Smethwick. No. 10,886; May 13, 1903.

In the course of his specification, the patentee remarks that in the usual feeding appliances there is a continuous coal-hopper fixed in front of, and over the charging side of, the bench of retorts, and underneath are measuring chambers, one of each being capable of discharging into any of the (usually three) retorts in a vertical row. Each of these measuring chambers is provided with two horizontal sliding doors, one at the top and the other at the bottom, and connected together by a two-armed lever so arranged that when one door is open the other is closed. The charge is measured and discharged into the retorts by opening the top and closing the bottom door, so that the coal falls down on to the bottom door and fills the measure. Then the top door is closed and the bottom one is opened, so that the measured charge now falls down into the charging shoot, and so on into the retort. The present invention is designed to provide means for regulating the size of the outlet from the measuring chamber while the inlet at the top is closed, so that the man who is charging the retorts can instantly increase or diminish the size of the outlet as he may think necessary, as an experienced man can tell by the sound which the falling coal makes when hitting the bottom of the charging shoot whether the coal is running at sufficient speed to form a proper even layer along the whole length of the retort.

An illustration is given of a part of an ordinary feeding appliance for inclined gas-retorts, but with the two sliding inlet and outlet doors of the measuring chamber constructed in accordance with this invention.

D is the sliding door which controls the inlet of the measuring chamber; while the sliding door E controls the outlet. The doors are connected to the two-armed lever F by the usual links G H; and the two-armed lever F is connected to the shorter arm of the operating lever I of the link J. So far, this is the usual construction.

The top sliding door D has a hole about the same size as the inlet from the coal-hopper above, and the blank part of the top sliding door is made longer than heretofore—say about half the length of the opening; and an additional blank part is provided on the bottom sliding door E beyond the usual opening, so that the doors D E will now act together in the following manner: The man on the charging stage puts the lever I over to the position shown at K, thereby fully opening the top slide and closing the bottom one, so that a charge of coal runs down from the hopper, through the hole in the slide D, and into the measuring chamber. The lever I is now pulled over to the position shown by the dotted line L, thereby fully closing the top slide and fully opening the bottom one. With dry small coal in the event of the door E being fully open, the coal falls into the charging shoot C quicker than it can get out of the mouth of the measuring chamber.



Consequently, the coal begins to form up in the shoot; and the speed of the coal entering the retort is reduced, and it does not have sufficient energy to reach the bottom of the retort. Under these circumstances, owing to the provision of the extra length of blank part in the top door D, the operator can pull the lever I to the position shown by M—that is, about half as far again as usual—and this, while still keeping the top door of the measuring chamber shut, causes the blank space of the bottom door to about half close the outlet; and, consequently, while not allowing any more coal to get into the measuring chamber to disturb the already measured amount, this contraction of the outlet checks the speed of the coal when leaving the measuring chamber, and gives time for the charging shoot C to clear itself. The coal thus has the proper impetus to carry it to the bottom of the retort and to be delivered in an even stratum.

APPLICATIONS FOR LETTERS PATENT.

7822.—Douglas, J. T., and Livens, F. H., "Internal combustion engines." April 5.
7857.—Howarth, S., "Wheelbarrow for removing hot substances." April 5.
7859.—Johnson, S., "Regulating gas." April 5.
7906.—Glinickel F., and Tresenreuter, G., "Carburetting apparatus." April 5.
7909.—Rowbotham, W., "Gas-engines." April 6.
7912.—Baranovits, G., and Molnár, S., "Incandescent burners." April 6.
7930.—Grossmann, J., "Manufacture of gas." April 6
7959.—Woodall, H. W., and Duckham, A. M'D., "Carbonization of coal." April 6.
7962.—Galiani, A., and Giorgi, G., "Lighting and extinguishing public lamps. April 6.
7979.—Boutillier, L., "Gas-producers." April 6.
7987.—Key, J., "Gas water-heater." April 6.
7999.—Simmons, W. H., and Leach, W., "Gas-taps." April 7.
8028.—Harrington, R., and Martineau, W., "Incandescent lighting." April 7.
8043.—Luson, T. G., "Gas-globes." April 7.
8083.—M'Kirdy, J., "Preventing pipes breaking through vibration or strains." April 8.
8130.—Carmichael, J. D., "Distributing and transmitting the power of internal combustion engines." A communication from F. Lavagna. April 8.
8144.—Nyren, T. B., "Enriching gas." April 9.
8147.—Kinsey, H., Challenger, G., and Nott, J. H., "Manufacture of acetylene gas." April 9.
8151.—Cox, G. J., "Gas cooker and heater." April 9.
8152.—Cox, G. J., "Internal combustion engines." April 9.
8153.—Cox. G. J., "Atmospheric burners." April 9.
8212.—Weickart, T. H. W., "Mantle supports." April 9.
8213.—Weickart, T. H. W., "Bunsen burners." April 9.
8214.—Weickart, T. H. W., "Burner with bye-pass." April 9.
8222.—Forbes, Sir C. S., "Acetylene generators." April 9.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Stops — not Slots.

SIR,—The poor slot meter! How can it survive after eleven columns of the "JOURNAL" have been devoted to prove by statements, arguments, &c., that it and its advocates are wrong, and that the stop meter is the right thing?

I cannot say that I am convinced. In the first place, the stop does not seem so popular with the consumers as the slot, for Croydon began with the former in 1889, some years before the latter became practicable, and has only now reached a total of 8548 stop meters, and, adding the 757 Carshalton stops, the total is 9305, against 12,030 ordinary consumers, or (say) 77 per cent.; whereas many slot meter companies have in much less time reached 100 per cent., and in some cases considerably more. The inference is that the slot system is much the best, if measured by the increase in the number of consumers.

Then, as to cooking-stoves, at Croydon "about 50 per cent. of the 8548 (stop meter) consumers do not require the service of one." At this, one is not surprised, seeing that the rent of 2d. per week or 8s. 8d. a year is 18 per cent. on the cost—£2 8s. 1d.—of the stove, instead of the usual 10 per cent. With slot meters, as many as 75 or even 80 per cent. have cooking-stoves; and although it may be true that some small proportion do not use sufficient gas to pay a fair rent for the stove, there is no doubt that, as a whole, they largely increase the consumption of gas, shown especially by the midday demand on Sunday, and therefore produce sufficient by the extra 9d. per 1000 cubic feet charged to slot meter consumers to pay for interest and maintenance of meter, stove, and fittings.

I agree with the statement that, in the case of slot meter consumers who use much more than the average quantity of gas, the 9d. per 1000 cubic feet does them some injustice; but with the best intentions, and the most perfect systems man can devise, absolute justice is often unattainable—not only with slot meters. The large consumers, however, have the remedy in their own hands, and many have applied it—viz., to ask for an ordinary meter, paying the ordinary price, *plus* the usual rent for meter, stove, and fittings.

Then there are the small consumers by slot meters who do not burn enough gas to provide sufficient to pay for the installation. These are probably in most cases very poor; and if the Company lose slightly by them, it is nothing to trouble about, and, except refusing to supply these poor people, nothing can be done. For the great bulk of slot meter consumers, however, the average payment is not far wrong.

But granting the hardship to some large consumers by slot meters—who can if they will obtain relief—is the stop meter system any better? for I read in the "JOURNAL" that "the difference expressed in terms of per 1000 cubic feet sold is 1·81d. in favour of the stop-meter system." This, of course, is an average, and means that, whereas at Croydon the usual 9d. per 1000 has been added to the price of gas to the slot meter consumers, they will by the change to stop meters have to pay 10·81d., or nearly 2d. per 1000 feet more, which looks like something approaching an injustice. To my mind, therefore, the only advantage to the Company from the stop meter is this very questionable excess of 1·81d.; the disadvantages being that both the increase in the number of consumers and the use of cooking-stoves are checked, while no advantage, but rather the contrary, accrues to the average consumer. Judging from the statements in the two articles, it seems probable that the consumers by stop meters are, as a class, somewhat better off than those to whom the slot meter with its pennyworths of gas is so great a convenience.

I therefore stand by the slot as having been the means of causing by far the greatest development in the use of gas that the industry has ever experienced during the whole course of its eventful and beneficent history.

April 16, 1904. GEORGE LIVESEY.

"Jager" v. "Standard" Purifier-Grids.

SIR,—Mr. Marshall quite misapprehends the way we regarded his communication. With your permission, therefore, we beg again to thank him for what he has said in praise of the "Jäger" grids.

What really influenced our comments was the sense of surprise we felt that an engineer with Mr. Marshall's experience of concrete construction would expect other engineers to give credence to the suggestion that oxide of iron or lime properly prepared for gas purification would satisfactorily form itself into stable, unyielding arches capable of sustaining, and of continuing to sustain, a mass, more or less thick, of superimposed material of the same kind—the spaces between the supports of the arch being approximately 4 inches.

Such a robust faith in the cohesion of materials recalls memories of one's hopes and disappointments when, in the happy holidays of old, we erected such apparently redoubtable structures on the seashore with the temporarily plastic material so liberally provided when the tide went out.

Now the differences between the "Standard" and the "Jäger" systems, although quite truly comprising the arrangement so long desired, whereby the gas is distributed laterally (and thus permitting the purifiers to be of greater depth without increase of pressure), comprises also the fact that the grid bars when viewed from above form what is really a complete platform for carrying the weight of the oxide. But these bars being disposed in the manner they are, they permit just that graduated and uniform amount of consolidation that presents the material in its most suitable condition for purification, and maintains it in that condition. We submit that it would be fallacious to rely on the "Standard" grid fulfilling any such duty.

Mr. Marshall also misinterprets what we said about the title he has applied to his grid, with which we are not concerned, except only that we desired to assure ourselves that we were right in indentifying the "F. D. Marshall patent" with that which we had previously known as the "Bamag." In our case, we have been content to continue the use of the name under which the "Jäger" grid has made its reputation abroad.

We extremely regret to observe the distinct misrepresentations Mr. Marshall suggests when he states that we made efforts to acquire his patent. We did nothing of the kind. Such an idea can only have arisen in his mind if the wish "were parent to the thought."

Before definitely taking up the "Jäger," we of course acquainted ourselves with all its possible rivals; and when Mr. Marshall made us an offer of terms on which we could (if we chose to accept same) avoid his competition, we unhesitatingly refused them.

We note that Mr. Marshall does not respond to our suggestion that he should furnish particulars of the behaviour of the "Bamag" grid at the Gitschinerstrasse Gas-Works, where there is in use not only the first set of "Jäger" grid, but the second set for four purifiers ordered since the first was put into operation.

Millwall, E., April 14, 1904. SAM. CUTLER AND SONS.

[Without any desire to check this correspondence if anything of a profitable technical nature is to be obtained from it, we would suggest to both Mr. Marshall and Messrs. Cutler and Sons that, if there is not, they will now best consult their own dignity by discontinuing it as quickly as a reply to the one or two points referred to in this letter will permit. Mr. Marshall and Messrs. Cutler and Sons have reputations as level-headed engineers. They have both something to sell; and both naturally regard their goods as the better. Gas engineers will be quite content under the circumstances to have the experiences of gas-works that have used the two systems. This and the last letter of Messrs. Cutler suggest a way of obtaining comparable experience. In the letter published on April 5, they gave the results of the tests made on purifiers fitted with the "Jäger" grids at the Gitschinerstrasse works in Berlin. It is understood that there are purifiers fitted there with what are known in England as the "Standard" grids. Now cannot Mr. Marshall put before our readers, the similar figures from those works applying to his grids? The tests being made under precisely like conditions, will give readers just the comparison they want.—ED. J.G.L.]

PARLIAMENTARY INTELLIGENCE.

GLEANINGS FROM THE COMMITTEE ROOMS.

The Crystal Palace Gas Bill and Progress.

THE Commons returned to their duties on Tuesday; and the rest of the week saw several Committees at work. But only two or three of them held out to Friday afternoon. One of the events of the week was the second reading of the Crystal Palace District Gas Company's Bill, and surmise was general as to what was now going to happen in connection with it, in view of the pronouncement made when the Bill was before the House of Commons on the former occasion. All doubt, however, will now be set at rest by the explanation appearing in the editorial columns to-day. In short, it is that the Bill is likely to go forward unopposed, through the Directors having adopted the simple expedient of clearing away the grounds for opposition by expunging the clauses relating to sulphur compounds, illuminating power, and testing, and dropping the Bermondsey clause. In view of what transpired when the Bill was brought to the notice of the House just before Easter, it was hopeless for the Directors to persevere with these clauses this session. The other portions of the Bill, however, are worth having. At the beginning of the week, the measure was in Group G; now it has been put into Group C, and has two bulky Electric and Power Gas Bills interposed between it and further progress.

The only measure referring to gas considered last week was the Omnibus Bill of the Doncaster Corporation, and that, it will be seen, contains some interesting points. The remarkable opposition to the Water Bill of the Barnet Gas and Water Company was a feature of the week; but the result is looked forward to with composure by the promoters. It has, however, been an anxious time for them. One old campaigner in the Committee rooms came back, after—well, it must be—several years' absence now, as a Director of the Barnet Company to witness the fight over the Bill. This was Mr. Alfred Lass. Surroundings and procedure are the same as they were when he was at the height of his parliamentary practice as an expert gas and water accountant. But he finds the men are largely changed. Many of the old practitioners have given place to new. There are few left of the old ranks that Mr. Lass knew, and who knew Mr. Lass in the best and busiest years of his work. Few of the old prominent members of the Bar remain. They have either passed away, retired, or are now only occasionally seen in the rooms. And the same of the professional gas men who were his compeers at Westminster in those times—not many of them are still in practice. But the last years of his work, of course, brought him into frequent contact with some of those who now carry on the same fights with which formerly he was so intimately identified. However, we must not be too reminiscent.

Another Bill which passed through Committee has been the Amersham, Beaconsfield, and District Water Bill. There was, too, a fair amount of discussion on the Appleby Corporation Gas Purchase Bill, when before the Commons Committee on Unopposed Measures on Thursday; and Sir Chandos Leigh, the Speaker's Counsel (who, as a Gas Director, knows, and it is a good thing, more about gas administration than is always convenient to promoters), questioned the advisability of having such large discounts as were proposed in this Bill

—viz., 10 per cent. for prompt payment, and 15 per cent. for large consumers. He said he did not like this, as it really meant a discount of 25 per cent. for some consumers. He had, however, been unable to get Lord Morley to see eye to eye with him in this matter, and so the clause must stand. On Thursday this week, some of the Lords Committees will set to work again.

The Peculiar Case of Doncaster. If the whole history of gas enterprise in this country was searched through and through, a parallel case to that of the gas undertaking of the Doncaster Corporation, we venture to positively declare, would not be found. Though the works were established in 1827, it is not until this present session of Parliament that the Corporation have come to Westminster for statutory powers in respect of them; and yet something like 190 million cubic feet of gas are now being made in the year. How this unique position has been created is worth telling in outline. In the year mentioned—1827—the Corporation joined a number of private individuals in providing a supply of gas for the borough; the whole of the subscribers being enrolled under the title of the Doncaster Gaslight Company. Under the Deed of Covenant, the Corporation took 333 shares out of a total of 784, and advanced at the same time £2970 by way of loan. By the deed, too, the whole of the management was vested in the Corporation, who also held the property in trust for all parties, and had the regulation of the business even to settling the price to be charged for gas. A Committee of management was formed, consisting of the major part of the Corporation and a few of the subscribers. Works were built; and from 1827 down to 1858, the price of gas was reduced continuously, and the business was, for those times, successful. The Corporation then decided to buy out the private subscribers; and they did so by giving to those shareholders who so desired bonds to the value of their shares, *plus* 50 per cent. premium, and by paying off the remaining shareholders on the same lines. The Corporation have therefore been the actual owners of the undertaking from 1858. To the year 1870, the profits were absorbed in paying interest on the loans and the amount held by the Corporation, in redeeming a portion of the bonds, and in works and mains extensions to the value of £15,488. A few years previous to this, two outside districts—Balby-with-Hexthorpe and Wheatley—asked the Corporation to supply them with gas; but the gas taken by these districts just before 1870 only amounted to about, in the first-named area, a million cubic feet a year, and in the other about 100,000 cubic feet. From that time to the last financial year, the gross profits have been in part applied to the paying off of bonds, to the payment of capital expenditure incurred from year to year (to the extent of about 2·3d. per 1000 cubic feet of gas sold), and to the payment of bank interest and temporary loans—the balance being taken to the borough fund.

The Main Object of the Bill. That practically shows the position to-day. The Corporation in their untrammelled position have acted wisely, and have treated generously the outside districts. They could supply gas of any illuminating power they liked, and at any price. But coming up to date, alterations and extensions of the gas-works are necessary in consequence of the increased demand for gas both in and outside the borough; and therefore extra money is needed. Consequently it was resolved to now apply to Parliament for statutory powers for the first time. And here comes the point upon which the outside districts appeared in opposition before the Police and Sanitary Committee last week. As the Corporation had been supplying these outside districts without statutory powers, it was thought advisable, before spending money on extensive works, partly to meet the supply to these outer districts, to ask Parliament to confer powers of supply in the areas, so as to avoid the possibility of being thrown over by the districts after spending the money on new works. Of course, as things now stand, the Local Authorities of the districts could cease to take gas from the Corporation, or the Corporation could cease, if they were so disposed, to supply them. But as soon as the Bill was deposited, the outside Authorities (who had not previously made any complaint as to the supply or the price) filed petitions against the measure—of course, with the view of getting the best terms possible from the Corporation. Among their suggestions is this, that the Corporation have been paying past capital charges from year to year out of revenue; and therefore have been penalizing the outside consumers through the price charged for gas. They completely ignore the fact that, relatively, their contribution has been small compared with the borough consumers. Excepting about £12,000, everything has been paid off by the Corporation; and all the advantages of not having a heavy capital account has been enjoyed by the outside consumers in common with the inside ones. However, their point is that their consumption during the past two or three years has been increasing rapidly; and that they have been assisting in building up a valuable undertaking for the borough. The natural reply of the Corporation to this is that, if they had raised money in the ordinary way, they would have had to provide a sinking fund in the price charged for gas, which would have been practically equivalent to the actual charge made—viz., the before-mentioned 2·3d. per 1000 cubic feet of gas sold. The answer was brought out very clearly in the evidence of the Engineer and Manager (Mr. Robert Watson), whose explicit and cogent testimony showed the thoroughness with which he had entered into the preparation of his case for the Corporation. Taking out the quantities of gas sold in the various districts between the years 1870 and 1903, he found the capital expended out of revenue in the 33 years was £29,000, and of this the outside districts could only have contributed £3500 odd. So that out of a capital of £67,000 shown by the last published abstract of accounts of the gas undertaking, the outside districts have only contributed this £3500. Now as against this the Corporation have been supplying the districts with gas at the same price as to the consumers inside the borough; and the same conditions have applied regarding the abolition of meter-rents and the charge for public lighting, though the latter has been carried on at under cost price—in spite of the fact that the distribution and administrative charges have been relatively higher in these outside districts than in the borough, and that the capital charges for plant in the outside districts have also been greater per consumer than in the borough. Looking at all of which, it must be said that the Corporation were fully within their right in asking and expecting Parliament to give them powers to supply in these outside districts—treating them precisely in the future, as in the past, the same as the borough consumers. That was the point upon which the attack of the opposition was the fiercest. What happened will be told presently.

Other Objects, and the Decision. The section of the Corporation Bill referring to the gas undertaking included an application for additional capital powers to the extent of £40,000; for the fixing of the illuminating power of the gas at 15 candles, though 17½-candle gas is being supplied; and for several other matters. Originally the maximum price asked for was 4s., but this has been reduced to 3s. 6d. The Derby prepayment meter clause is in; and no objection to this is raised by the Engineer. A novel clause (which we believe the Local Government Board did not appreciate, but which was not referred to in the decision of the Committee) requires prepayment consumers to give the same notice as ordinary consumers. A power gas clause also stands in the Bill. In the result, the unanimous decision of Mr. Heywood Johnstone and his colleagues was that the Corporation should have the powers of supply over the outside districts; their opinion being that the Local Authorities had no substantial or valid claim to any share of the present capital of the undertaking. A very important expression of opinion was made here, to the effect that, in the management of their gas-works, the action of the Corporation in making provision for capital expenditure from year to year out of revenue was a course which might well be followed by other corporations. A clause was inserted binding the Corporation to supply, as they had promised to do, the outside districts on the same terms as the borough. A purchase clause in favour of the Local Authorities was also included in respect of the mains and plant in their respective districts; but there is a rider which provides for compensation being paid to the Corporation during the time that, in consequence of the purchase, any part of their plant is rendered idle. Mr. Corbet Woodall was retained by the Corporation, and Mr. E. Herbert Stevenson by the opposition; and both gave evidence. The result is one which has given much satisfaction to all concerned in the administration of the Doncaster Gas-Works.

The Water Clauses of the Bill. Preceding the consideration of the section of the Doncaster Bill referring to gas, the water clauses were discussed; there being substantial opposition to them principally with the view of obtaining the repeal of the power to charge for water in the outside districts 25 per cent. in excess of the rate in the borough. The Committee completely endorsed the proposals of the Corporation as to the laying of a new pipe-line and the construction of a service reservoir at Warmsworth, as well as the purchase for the protection of the embankment of their reservoir of the coal and minerals under it. Extensions of area and mains were also sanctioned; but the Committee insisted that a constant supply should be given (wherever it is possible to supply by gravitation) both within existing limits of supply and in the added area. But the Committee were fully convinced that the charge of 25 per cent. extra in the outer districts was justified. The water-supply matters discussed were so entirely of local interest that they need not be further mentioned in these notes. But the decisions of the Committee show how completely they were in accord with the Corporation in respect of both their gas and water policy.

Barnet's Struggle for Water. The Bill of the Barnet Gas and Water Company got before the Committee of which Captain Jessel is the Chairman on Thursday morning. If ever promoters when before a Parliamentary Committee deserved pity, it is those who are responsible for this Bill, which is as necessary to the Company and to the large and growing district they serve as ever a Water Bill within recent years has been to any undertakers or district. From its introduction, the Bill has received unmerited opposition; and its progress has been deterred with almost bitter animosity. The opponents are powerful; and they all came up to the Committee room armed metaphorically to the teeth, with the sole purpose of killing the Bill if any means existed by which it could be accomplished. King's Counsel and juniors and experts were there galore. But the Company were equally well prepared as the opposing force—they being represented by Sir Ralph Littler, K.C., Mr. Balfour Browne, K.C., Mr. Honoratus Lloyd, K.C., Mr. D. C. Bartley, and a retinue of eminent engineers, chemists, and geologists, as our report of their evidence will show when published. The fight will—through regrettable necessity—be an expensive one for the Company; but the Directors and their Engineer and Manager (Mr. T. H. Martin) have shown sound generalship in not underestimating, in the interests of the Company, the work they had before them. Those readers who have followed the history of the Company will know that their quest for water has been one of anxious constancy; and nothing has been left undone—the advice of the highest specialists and heavy expenditure have not been wanting—to gain the desired goal. But the quantity of water that has rewarded their efforts has been disappointing beyond measure. Under the circumstances, they asked Parliament this year to be allowed to sink a new well and pumping-station at Little Berkhampstead, in Hertfordshire, to construct a reservoir at Shenley, and to acquire new lands. The measure also provides for constant service, on the completion of the new works, within those parts of the district not higher than 400 feet above O.D. The Company also asked to be allowed to raise a further amount of £250,000 of "D" water capital, with one-fourth loan. A clause is included, having in view approaching electrical traction in the district, seeking for full compensation for damage to their mains and pipes by electrolytic action. But on the main part of the Bill, there is no question about it that the Company and the district require additional water resources, and that as early as possible; and upon this point the Chairman announced on Friday that the Committee were completely satisfied. This was encouraging to the promoters.

The Opposition Contentions. In connection with this Bill and another that was earlier before the same Committee, an old cry has been raised. A few years ago, in eminent fights over water schemes, "Welsh water for Wales" was continually heard. Now the same cry is being raised by counties. "Herts

water for Hertfordshire," "Bucks water for Buckinghamshire," are war-whoops of to-day. More ridiculous contentions than these sentiments convey cannot be conceived. If Parliament had recognized such geographical limits to the obtaining of water in the past, perhaps half the kingdom to-day would be thirsting for it; while the other half would have more than they could possibly know what to do with now or at any time hereafter. Where would London, Manchester, Liverpool, Birmingham, and hundreds of other places, have been to-day, if Parliament had been moved by like considerations when these cities and towns were asking for more water? Next we shall be having fanatics trying to conserve the coal-fields of the country for the particular counties in which they are situated; and then why should not the Scot and the Irishman in England be sent back to their own portions of the kingdom, and the English who have settled in Ireland and Scotland be returned to their own soil? It is a peculiar feature of this opposition to the Barnet Bill that the Herts County Council were opposing because they feared that the proposed well would seriously aggravate the injury to the water-levels in the chalk formation of the county already caused by the operations of the New River and East London Companies; and yet of the population supplied by the Barnet Company more than one-third are in Hertfordshire, and the well will be more than a mile from any existing well. But the Herts County Council had in mind the other two-thirds of the population supplied, who are located in Middlesex. Then a more remarkable thing is, in view of this latter fact, that the Middlesex County Council took exception to the proposed well in Hertfordshire, because they believed it would have a prejudicial effect on the supply of Middlesex. Evidently they have little care as to what becomes of the important section of the Company's consumers who reside in the county over which they have jurisdiction. Then comes London—represented by the Metropolitan Water Board—alleging that the construction of the well in Hertfordshire will materially affect their sources of supply. Poor Barnet! So long as these powerful Public Authorities can protect, and provide for, themselves, the consumers of this private enterprise may be starved of this necessary of life for aught they care. Compunction finds no place with these bodies; and if they all had their way, there would not be a place from which the Company could extract another gallon of water. No Company could ever have had a more peculiar position to wrestle with than that created by this opposition. However, by Friday they had come to an agreement with Middlesex, though Middlesex reserved their right to still appear if necessary. By this agreement, the Company are not to supply in bulk or otherwise from their present sources for use outside their existing limits; they are also confined to 5 acres in respect of any additional lands for their works in Middlesex; and they are further restrained to the use of such land for the construction of a reservoir or other works necessary or convenient for the supply of water in Middlesex. The Finchley District Council also opposed. But their opposition related to the question of constant supply; and they have been satisfied on this head, though they also reserved the right to make a further appearance if necessary. The promoters had not finished when the Committee rose on Friday; but they had made out a good case and fought well for their Bill against the tremendous odds in numbers and power hostile to them. Two or three witnesses had also spoken on the electrolysis question; and Mr. J. G. Newbigging had samples of affected pipes present which he has recently found in Manchester. Professor Dewar has no doubt as to their injury being due to electrical action.

[Yesterday the promoters' case was concluded shortly after noon; and the case for the opposition was opened—Mr. Baggallay, K.C., being the first to address the Committee.]

The Fight for Gerrard's Cross.

Gerrard's Cross is a small place in Buckinghamshire, with a diminutive but increasing population; and it is a place now coveted by two Water Companies, but to one there is every prospect that it is lost for ever. To gain that village, the Rickmansworth and Uxbridge Valley Water Company and the Amersham, Beaconsfield, and District Water Company both promoted Bills this session. The district is nearer to that of the first-named Company; and if error, dilatoriness, and want of diplomacy had not marked their past in this one particular, they might by this time, there is every reason to believe, have had Gerrard's Cross as a part of their territory. But the jealousy of the Bucks County Council for the conservation of the water within their boundary for their own population has become a factor to be reckoned with; and on second reading the Rickmansworth Bill was overthrown. The spirit of water conservation which has got the upper hand of the County Council is not, however, a sufficient reason for keeping the Rickmansworth Company from the supplying of Gerrard's Cross; but those who have followed the matter cannot but feel that they have themselves only to blame to-day for the favour that has been shown to the Amersham Company, whose application to Parliament was supported by all the authorities and landowners who had any influence in the matter. Thus it came about that the Rickmansworth Company when the Amersham Bill was before Captain Jessel's Committee last Wednesday found themselves unsupported in their opposition. In 1902, they were asked, when proposing to rectify previous mistakes or misunderstandings over the supply of Gerrard's Cross, to give an undertaking that they would not take more water out of the county than they brought in. They refused; but when the Amersham Bill was before the Committee last week, with its bright prospects of success, the Rickmansworth Company were prepared to give the undertaking. The preamble of the Amersham Bill was, however, found proved; and the Rickmansworth Company are now meditating over their lost opportunities. Perhaps they will see whether the Lords will listen to their tale of repentance, and decline to accede to the Amersham proposals. But, in the circumstances, the feeling is uppermost that the Amersham Company deserve all success.

[The Committee, presided over by Mr. Cawley, yesterday commenced consideration of the Cheshire Electricity and Power Gas Bill. Following this will be the North-Western Electricity and Power Gas Bill, and the Crystal Palace District Gas Bill.]

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills read a second time: Crystal Palace District Gas Bill, Tynemouth Gas Bill [Lords].

Bills reported: Amersham, Beaconsfield, and District Water Bill, Appleby Corporation Gas Bill [Lords], Thurles Urban District Council Water Bill.

Bills read the third time and passed: Brixham Gas Bill, Colney Hatch Gas Bill, Southend-on-Sea Gas Bill.

The second reading, by order, of the Crystal Palace District Gas Bill on Tuesday was followed next day by the removal of the Bill from the group referred to Captain Jessel's Committee, and the placing of it among the Bills which are being dealt with by the Committee presided over by Mr. Cawley; its consideration being fixed for to-day. This change was succeeded on Thursday by the withdrawal of the petitions which had been presented against the Bill by the Lewisham Borough Council and the Beckenham and Penge Urban District Councils; and on Friday of those of the London County Council and Lambeth Borough Council.

POLICE AND SANITARY COMMITTEE.

DONCASTER CORPORATION BILL.

This Committee, which is presided over by Mr. HEYWOOD JOHNSTONE, had under consideration last Wednesday the Bill promoted by the Doncaster Corporation to obtain further powers in respect to their gas and water undertakings, and to raise more money.

Mr. BALFOUR BROWNE, K.C., Mr. E. PAGE, K.C., and Mr. VESEY KNOX appeared for the promoters; the petitioners in opposition being represented as follows: The Wheatley Urban District Council and the Doncaster Rural District Council by Mr. G. J. TALBOT; the Yorkshire Electric Power Company by Mr. FREEMAN, K.C.; and the Balby and Hexthorpe Rural District Council by Mr. LEWIS COWARD, K.C., and Mr. E. SHORTT.

Mr. PAGE, in opening the case, said the only parts of the Bill which were opposed were those relating to water, to gas, and to electricity. He would deal, first, with the water portion. Doncaster was an ancient borough, with a population of 30,000, which had increased since 1881 by about 45 per cent. Its undertakings had been so successful that the rates of the town were very small; there being no borough rate, while the district rate amounted to only 2s. in the pound. The waterworks were constructed under an Act of 1873. They cost £170,000, which was twice the amount of the estimate; while the water obtained was only 500,000 gallons daily, which was about two-thirds the quantity estimated. The population having increased, power was obtained in 1896 to impound the waters of the Porter, one of the tributaries of the Don, and, further, to receive from Sheffield a million gallons daily in addition. At the end of the year, the full quantity would be received from Sheffield, which would enable the Corporation to supply a population of 75,000 with 25 gallons per head per day. The present proposals were to lay down a new pipe and to make a service reservoir at Warmsworth at a cost of £11,000, to purchase, at an outlay of £15,000, the coal and other minerals under the embankment of their reservoir, so that they might not be worked, and to make necessary extensions of mains, at a cost of £8000, to Cantley, Armthorpe, Kirk Sandall, and Sprotborough. If the water revenue remained stationary, there would be an annual deficiency equal to a rate of 1s. 8d. in the pound, which would be very serious. Hitherto the loss had been £2000 per annum, and it would have been greater if the Corporation had not possessed the power to charge the outside areas 25 per cent. more than they charged in Doncaster proper. Opposition to the Bill was offered by the outlying districts, in order to secure the abolition of this extra charge. With regard to the capital to be raised for water purposes, the Corporation asked that the period might be extended from 45 to 60 years; and Counsel quoted as a precedent for this course the case of Rotherham, where, he said, the circumstances were similar. In conclusion, he briefly referred to the petitions.

Mr. *W. H. R. Crabtree*, the Surveyor to the Doncaster Corporation, stated, in reply to Mr. VESEY KNOX, that while most of the Corporation undertakings had been successful, there was a deficit in regard to their water supply. The municipal outlay totalled £946,000, and the outstanding debt was £292,000; so that there was a surplus of £654,000. The population of Doncaster had risen from 27,000 in 1881 to 33,000 in 1892 and to 41,845 in 1901. In the water area there had been an increase from 22,000 in 1881 to 58,400 at the present time. The proposed new districts were now agricultural; but they would probably become thickly populated, and they would have no other means of obtaining a water supply than those now suggested. The estimates upon which the Act of 1873 was founded had not been verified. The rainfall had been less plentiful than was expected, and arrangements had been made for the supply of compensation water to which they were bound although they could not gather the water on which the quantity was based. The cost of obtaining the million gallons daily from Sheffield and Rotherham was £172,000. The existing service reservoir of the Corporation was equal to only one day's supply; and therefore it was proposed to construct one of three times the capacity at a cost of £11,000. With reference to the purchase of minerals, he said that mining operations were approaching dangerously near to the water-works, and power was consequently asked to acquire an area 26 acres in extent. As to the outlying districts, although they paid 25 per cent. more for their water, the rates on the Doncaster ratepayers were heavier than those on the inhabitants of the outlying districts. If the present income did not increase, the deficit on the water undertaking in future would amount to a rate of 1s. 8½d. in the pound; but if Parliament gave the relief sought in the extension of the period for repayment of the loan, this sum would be reduced, though the people of Doncaster would still be paying more for their water than those residing in the outlying districts. The case of Doncaster for special

treatment in regard to the repayment of the loan was even stronger than that of Rotherham, inasmuch as its district of supply was farther away, and the risks from pipes bursting and so forth were greater. In regard to the point made by the petitioners as to the Corporation having power, in case of necessity, to withhold the supply to the outlying districts before cutting off that to Doncaster, he urged that, when the Sheffield supply was available, there would be absolutely no danger of any water being cut off. The loss on the water undertaking itself was a great deal more than the extra 25 per cent. paid by the outlying districts.

Cross-examined by Mr. LEWIS COWARD, witness said it would be an extravagant thing for a community of 6000 or 7000, such as Balby-with-Hexthorpe, to set up gas and water undertakings, when they could be supplied from Doncaster. The water deficit was decreasing; and it reached its lowest point last year. The area within the present limits of supply could be severed from the Warmsworth reservoir, with the exception of Conisborough.

In re-examination by Mr. BALFOUR BROWNE, witness expressed the opinion that it was unfair that the outlying districts should be relieved from existing obligations by the repeal of old legislation.

By the COMMITTEE: The Corporation had considered the question of asking for power to increase their water charges, but had deliberately decided against this policy.

Mr. *H. Rhodes*, a mining engineer and colliery manager, said his firm had reported in favour of the proposed acquisition (to which there was no opposition) of the 26 acres of minerals.

This closed the case upon the water proposals of the Bill.

Mr. SHORTT, on behalf of the Balby-with-Hexthorpe Rural District Council, and Mr. TALBOT, representing the Wheatley Urban District Council and the Doncaster Rural District Council, then addressed the Committee.

The CHAIRMAN, after a short deliberation with his colleagues, found the preamble of the Bill proved so far as it related to the water proposals. They also decided that the extension of the area asked for was justified, and that a constant supply, where possible, must be given, both to the added area and also within the existing limits of supply. In this respect the Corporation of Doncaster must, he said, conform to the general law with regard to both the added area and to the existing area, where it was possible to supply by gravitation. The Chairman made no alteration with regard to the extra charge of 25 per cent. in the added area, thinking it was fully justified under the circumstances. There would be the usual clause enabling the Local Authority of any district outside the borough to purchase from the Corporation the part of the undertaking in their district. The Chairman endorsed the wisdom of the Corporation in basing their charges on rateable value and not on the rack-rent. They postponed dealing with the question of the period for the repayment of the loan.

Thursday, April 14.

Mr. BALFOUR BROWNE, in opening the case for the promoters on Part V. of the Bill (which relates to their gas undertaking), said that in 1764 the Corporation were authorized by a Local Act to light the streets of Doncaster; and until 1827 they were lighted by oil-lamps. At about the last-named date, the Doncaster Gaslight Company was formed by Deed of Covenant. The capital was £6000, in £10 shares, and there was power to augment the capital by £10,000 by mortgage and the sale of additional shares. The price of the gas then was 12s. 6d. per 1000 cubic feet. In 1858, the Corporation acquired the interests of the Company by Deed of Covenant. Up to that time, £16,150 had been spent. Between 1858 and 1870, another £15,498 was expended; making a total up to 1870 of £31,648. From time to time the Corporation had spent considerable amounts out of revenue. The total value of the undertaking at present was £67,526; while the Corporation only owed in bonds £12,000. The object of the Bill was very simple. Up to now, the Corporation had been the owners of the gas-works and suppliers of gas without any statutory authority at all; and they were here to obtain statutory authority to do what they had been doing in the past. They had not only supplied Doncaster, but the district of Balby-with-Hexthorpe, Wheatley, a village in the rural district called Bentley, and Carhouse. In 1886, an agreement was entered into with Balby under which the Corporation were to open the streets when they required to do so. This arrangement in all probability was not good in law; but it had been entered into at the request of the out-district. In 1902, owing to the increase of population, Balby complained that the gas supply was insufficient; and in order to meet the demands of the Urban Council, the Corporation of Doncaster laid down a 24-inch main at a cost of £1860. Wheatley was supplied in 1869 and Bentley in 1885. Carhouse also received gas from the promoters. The opponents of this part of the Bill were the outlying districts; and they held that the Corporation were making large profits, and that they (the petitioners) were therefore entitled to some such provision as was put in ordinary gas company Bills—viz., a sliding-scale. This system had worked exceedingly well; but he had never heard of its being applied to an undertaking owned by a corporation, and he did not know how it could be. About £29,000 had been spent on capital account out of revenue; and though the people outside had the whole benefits of the works, they had only contributed £3595. When the outlying districts came to Doncaster and asked to be supplied with gas, the Corporation would have been justified in replying: "We will supply gas, but it must be at a higher price than that at which we supply the people of Doncaster, as it is evident that laying mains at long distances from the works is a costly matter, and also that laying them through a sparsely populated district is not very remunerative." But the Corporation had done nothing of the kind. The outlying districts were supplied with gas at precisely the same price as the borough. The price was 2s. 6d. per 1000 cubic feet, which compared favourably with that of any other town in Yorkshire; and all charge in the form of meter-rent had been abolished. These outside people came and said they ought to share the profits of the gas undertaking, by sliding-scale or otherwise; but that seemed to him unfair and ungenerous. His clients would not object to the outlying districts buying the gas undertaking within their areas, and supplying themselves with gas; but this they would not do, as they knew they could not supply themselves at anything like the low rate at which Doncaster could. In their petition, the opponents said that they should be allowed to audit the gas accounts of the Corporation; but this was simply an unheard of proposal.

The CHAIRMAN: At the present time, the charge for gas is in your own hands?

Mr. BALFOUR BROWNE replied in the affirmative, pointing out that his clients could charge whatever they liked. If the preamble of this part of the Bill were rejected, the Corporation would simply go on supplying gas as they were doing at present.

Mr. *Robert Watson*, the Engineer and Manager of the Corporation Gas-Works, was then called and examined by Mr. PAGE. He gave a succinct history of the undertaking confirming the opening statement of Counsel. He went on to say that 88 per cent. of the amount spent on the undertaking had been furnished by the ratepayers of Doncaster, that the total number of consumers by meter was 7198, and the number of public lamps supplied 1074. The demand for gas was increasing year by year, and the supply, which in 1870 was 53 million cubic feet, was 190 millions in 1892. The price charged now was 2s. 6d.; but in 1900, owing to the rise in the price of coal, it was 2s. 9d. It was reduced again, however, on April 1, 1903, to 2s. 6d., and discounts were allowed. The capital asked for under the Bill was for extensions of works. The whole of this would be required in a comparatively short time. The petitioners were asking for a sliding-scale; but he did not know of a case in which this had ever been applied to a corporation.

In cross-examination by Mr. LEWIS COWARD, witness said the gas-works had been extended from time to time very largely, although not entirely, out of profits. No doubt the Corporation had benefited by sales outside the borough; but not to so large an extent as they had benefited within the borough. Their capital stood at £67,526; but £22,160 was all that they had borrowed since 1858—the difference between the two amounts having been obtained from profits arising out of the undertaking. The price of gas charged in the outlying districts was the same as in Doncaster. During the past five years, £12,000 had been transferred to the borough fund out of the profits, and £3000 to new works account.

Mr. COWARD: And yet you ask for a maximum price of 3s. 6d. per 1000 cubic feet. Do you think this is fair?

Witness: Yes; because we have contributed the capital.

You have only contributed £22,000 out of the £67,526, and you get a profit out of us. Counsel then proceeded to ask if witness would raise objection to the application to Doncaster of the Glastonbury clause. This clause was to the effect that the balance if any of the revenue, together with income derived from the reserve fund, when it amounted to a tenth of the aggregate capital expenditure, should be applied by the Corporation in carrying to their district fund a sum not exceeding 1 per cent. per annum of their capital account, and, subject thereto, in a reduction of the price of gas when and as circumstances should permit the same to be done.

Witness said he should object to the adoption of this clause. The outside districts, he pointed out, had benefited by the low capital account of the undertaking and were being supplied at a lower rate than would be the case if the Corporation had sought to make an equitable adjustment between those districts and Doncaster. He thought it would be fair to charge the outlying districts 3¾d. more per 1000 feet than the borough consumers.

The CHAIRMAN: You consider that this represents interest on capital; the capital being found by the borough.

Witness: That is my view of it.

By Mr. TALBOT (for the Wheatley Urban District Council): The outside districts were increasing more in population than was the borough, and the demand for gas was likely to increase in the same ratio. It was true that the gas-works were close to the edge of the Wheatley district.

Re-examined by Mr. PAGE: In the case of an ordinary gas undertaking, there would have been a sinking fund and an amount put aside for depreciation. If that had been done in Doncaster, the gas profit would have been very much less than it had been.

Mr. *Corbet Woodall*, examined by Mr. VESEY KNOX, said he had been consulted on the subject of the Doncaster gas undertaking. Its history was unique. The fact that the Corporation of Doncaster were shareholders in the original Gas Company, and the fact of the accumulation of capital out of profits, though not without parallel, were unusual. During the last ten years, the gas sold by the Corporation had increased from 112 million cubic feet to 173 millions, or at the rate of 5 per cent. compound per annum. The capital employed per million cubic feet had been extremely small, and unnecessary capital had not been raised or put into the undertaking. The price charged was 2s. 6d. per 1000 cubic feet, subject to discounts of 5 and 10 per cent. There was no charge for meter-rent, which was very unusual, representing 2d. per 1000 cubic feet. The charge for public lighting was 50s. per lamp—a very low price. So far as the outlying districts were concerned, they could only get their gas cheaply from Doncaster. He had advised the Corporation that 3s. 6d. per 1000 cubic feet would be a sufficient maximum price; and they had adopted this view. The quality of the gas was 15-candle power, which was rather higher than usual. The arrangements in the Bill for discounts (from 10 to 15 per cent.) were reasonable. With regard to new capital, if the present rate of increase was maintained, the Corporation would want not £40,000, but £60,000, in the next ten years. They only asked for £40,000; and if they wanted more, they would have to come to the Local Government Board or to Parliament. Or they could go on as they had done in the past; and they would be well advised if they did. Asked what was his opinion as to the way in which the outside districts had been treated, witness said he thought they had been dealt with very fairly. The Corporation had not charged them more than the borough, though they might have done so, and, if they had followed precedent, would have done so. They had brought their profits back into the undertaking instead of obtaining mortgages; and the outlying districts had benefited by this as well as Doncaster. The extensions of the works would not have been as considerable as they had been had it not been for the supply of the outside districts. He did not think it reasonable to put in the Bill power for the breaking up of the under-

taking by the outlying districts. If the small local authorities wanted power to undertake local supplies, they should come to Parliament and ask for it. The Glastonbury case was not on all-fours with the present one. In the Glastonbury case, it was natural that limitations should be enacted, seeing that the Local Authority had expended nothing beyond the purchase money for the gas-works.

Mr. TALBOT, in cross-examination, asked witness if he considered as a general proposition that it was reasonable that one local authority should make a profit by its supply in the district of another authority, and to apply this profit solely to its own purposes. He replied that he thought that would be perfectly reasonable, seeing that a benefit was conferred on the outer district by a low price for gas. There was nothing unreasonable in the Glastonbury clause so far as it applied to Glastonbury; but it would be unreasonable to apply it to Doncaster. The Doncaster Corporation had made a profit out of their gas undertaking; but they had exercised a self-denying ordinance in investing a large proportion of the profit in the improvement and extension of the undertaking.

The CHAIRMAN (to Mr. Talbot): Do you suggest that municipal trading is particularly malignant if a profit is made out of it?

Mr. TALBOT: No; but I say that the profit should be applied to the good of the community that consumes the commodity.

Witness said he agreed that there should be a limitation of the amount of profit which should be taken out of the consumer.

In cross-examination by Mr. SHORTT (for Balby), witness said he should have no objection to the outlying districts coming to Parliament for a purchase Bill; but he objected to the application of the petitioners.

In re-examination by Mr. PAGE, witness said that the cost of the gas undertaking had been £67,000; and of this amount the outlying districts had contributed £3500. Even this £3500 had to be reduced by the consideration that the cost of gas distribution was greater in those districts than in Doncaster itself. He denied that Doncaster had ever made an unfair profit. He should be satisfied with the ordinary commercial profit; but this was begrudged the Corporation.

By Sir G. FARDELL: Profits should go in reduction of the price of gas to some extent, no doubt; but the Corporation should be allowed to take something for responsibility of control.

In reply to other members of the Committee, witness said the outying districts could not supply themselves as efficiently and cheaply as they could be supplied by Doncaster. These districts had a right to participate in the advantages of the profits realized, when adequate deductions were made. He did not, however, think that a sliding-scale was necessary.

Mr. *Nicholas*, of Wheatley, Manager of the Denaby Main Collieries, gave evidence for the Bill, regarding it as a waste of the ratepayers' money to offer opposition to it. He thought Wheatley had been fairly and liberally dealt with by Doncaster in the matter of gas supply.

Mr. *Samuel Stevens* and Mr. *Charles Henry Woodhouse*, of Hexthorpe, and Mr. *Wm. Johnson*, of Doncaster, Cantley, and Bentley, also gave evidence for the Bill.

The CHAIRMAN intimated that it was not necessary to call further evidence of this character.

This concluded the case for the promoters as regarded the gas portion of the Bill.

Mr. TALBOT then addressed the Committee on behalf of the petitioners. The Corporation, so far as concerned their relation with outside authorities, were solely a commercial concern, and were in no respect in a different position from the Company whose undertaking they had bought. They had made large profits—practically the whole of the existing capital having been provided from profits. So far as the profits derived from outside areas were devoted to purposes other than those from which the outside areas benefited, there was no justification for the action of the Corporation; and the evidence showed that the profit had been devoted not only to building up the undertaking, but to assisting the ratepayers of Doncaster in such a way as to confer no benefit on the outside areas. He asked that the amount that could be carried to the borough fund should be limited, and that the Corporation should be prohibited from spending money derived from outside areas in the manner adopted in the past. The Glastonbury clause would do the Corporation no injustice. It would recoup them all that they were entitled to be recouped. Certainly it was absolutely opposed to all sound principles that they should make a profit out of the outside areas, and that those areas should have no share of it.

Mr. *E. H. Stevenson*, examined by Mr. TALBOT, said the Corporation were in no different position with regard to the outside districts from a commercial company, so far as he could see. He did not know of a corporation or district council Bill of this description having been passed for a large number of years without a purchase clause being inserted—either with reference to the pipes, fittings, and other apparatus, or with reference to a portion of the undertaking. The outside areas had found a considerable portion of the capital of the undertaking—more than £3500. Much of the capital employed in it, such as that spent on the purchase of new meters and new stoves, and that employed in the new works account, was not shown in the capital account. The purchase clause proposed was in the form suggested by the Local Government Board. The outside areas were increasing at a far greater rate than the borough itself, and therefore the proportion of profit which they would contribute would advance with the increase. Large sums had been spent on meters and stoves out of revenue which should have come out of capital.

Mr. TALBOT: Will you explain that?

Witness: The accounts are not kept as they ought to be—at least, not as they would be under schedule "B" of the Gas-Works Clauses Act. I at first took the whole of the meter and fittings department as being meters and kindred articles; and the gas-stoves and carriage I also took as the same. On the other hand, I deducted the receipts for fittings; and I then made out that they had expended equal to 4·58d. per 1000 cubic feet of gas. In looking through the details, however, I see that some of the items may have been partly for service-pipes and partly for other things. But only taking the item put down for meters and repairs, and the item put down for gas-stoves, that comes to 2·6d. instead of not more than 1¼d. Certainly some of the wages down here, and some of the piping and other things, would come under the head of meters and stoves—refixing and repairs. So there was certainly more expended than 2·6d.

The profit, even allowing for that as revenue expenditure, is equivalent to 8d. per 1000 cubic feet on the year 1902-3?—The profit beyond that (amounts paid to capital, new works, borough fund, and balance of profit) comes to 8·4d. If we only add a little more than 1¼d. to this, it is even then over 9¾d.

This represents, in your view, the reduction in the price of gas which the Corporation ought to have made if they had charged the price to which the outside districts are reasonably entitled?—Yes; they could easily have done that in 1903.

Further examined: He considered that a corporation supplying an outside area should be limited in the amount they could carry to the borough fund. The Glastonbury clause would give the Corporation all the return to which they were entitled for the capital expenditure on the undertaking, and for the work they did in managing the concern. As to the testing-station being away from the works, where such a provision was sought by a local authority it was more often allowed than not.

In cross-examination by Mr. PAGE, witness said the capital of the gas undertaking ought to be not £67,000, but a least £120,000; large sums in the past thirty years having been taken out of the pockets of the consumers and devoted to capital purposes. Money expended on new works account had not been included in the capital expenditure. The gas-works could not have been built for less than £120,000. As far as he could make out, the Corporation had only spent on gas-works, out of capital pure and simple, £22,000. Parliament had not recognized the breaking up of a district served by a gas company; but Parliament had invariably recognized the breaking up of a district served with gas by a local authority, when the authority of a part of the district felt strong enough to break off. The Corporation, in respect of capital fairly expended on the gas-works, should get a return sufficient for sinking fund and interest, besides a small allowance for management—in all, perhaps 5 per cent., not more.

Mr. PAGE: You consider the position of the outside consumer ought to be better, inasmuch as he buys from a corporation and not from a company?—

Witness: Certainly, it ought.

That is 5 per cent. on £30,000, or £1500 a year?—In so far as it is not paid off.

By Mr. LUKE WHITE: In the rural district, the rural district council should have the power to purchase. He could not give an instance of a rural district council being the owners of gas-works; but in the case of Freshwater, a rural district council had the power to purchase. It would be wiser he thought for the outlying districts to take their gas from Doncaster for the present.

By the CHAIRMAN: The outside districts would be injured by the Bill, inasmuch as there was no safeguard in it as to gas being supplied them at a reasonable price, not even with a standard fixed at 3s. 6d., because the Corporation admitted that they could supply at nearly 2s. per 1000 cubic feet. Further, the outside areas would be unable, if the Bill were passed, to supply themselves with gas, as they could do at present.

The CHAIRMAN: Then we may take it from you that no standard can be devised which will ensure their receiving gas at a reasonable price?

Witness: It would be very difficult with a local authority. The only possible way that I can see would be to treat them as if they were a company, and say a standard price of so much—"For every penny in price that you reduce you may put so much to your borough fund as clear profit."

Then reasonable price is a question of profit and loss, and not of amount, in dealing with gas?—Entirely.

Friday, April 15.

Mr. TALBOT said he had witnesses who were prepared to prove the passing of resolutions on the gas question by the petitioning Local Authorities; but he would not call them unless the Committee desired to hear them.

The CHAIRMAN said it would be as well that these gentlemen should give reasons for the attitude taken up by the petitioners.

Mr. *Frank Allen*, Clerk to the Balby-with-Hexthorpe Urban District Council, said that at a meeting of that authority (seven out of nine members being present) a resolution was unanimously carried declaring it to be expedient to oppose the Bill. Subsequently, a conference of the three Local Authorities interested was held at which a similar resolution was passed. They had asked the Corporation for a concession on the lines indicated in the course of this inquiry; and the Corporation had replied that they could not undertake to introduce a clause in the Bill regulating the price of gas by means of a sliding-scale—this being the gist of the whole matter.

In cross-examination by Mr. BALFOUR BROWNE, witness said he had not advised the Local Authority to oppose the Bill. They had not complained of the gas supply given by the Doncaster Corporation. All they wanted was adequate protection.

Mr. SHORTT then addressed the Committee for the Balby Council, stating that he did not propose to call evidence and that the speech of Mr. Talbot really covered the whole ground. The Corporation of Doncaster had chosen to take their gas supply into the outside districts, and had treated Balby as though it were a suburb of a big town. No doubt benefit accrued to Balby; but Doncaster also benefited. The result could be crystallized into this, that after fifty years' trading, the Doncaster Corporation had an undertaking valued at upwards of £67,000—an undertaking which, as they had heard, could not be put up to-day for less than £120,000—and their gas debt was only £12,000. The Corporation had chosen to go into Balby for their own purposes; and they had been successful, owing to good management and good advice. Balby's complaint was not that they had been charged an inordinate price for gas, but that they had not been treated by Doncaster as one local authority should treat another. They had been dealt with as though they were customers of an ordinary trading commercial company. Of course, they had been entitled to do that in the

past, for though by agreement the Corporation had the right to break up the streets of Balby, there was no obligation on the part of the District Council to take the Corporation gas, nor on the part of the Corporation to supply it. To-morrow, if some power company offered Balby a cheaper means of lighting, there was nothing to prevent them from accepting it. But if the Bill passed, and statutory powers were set up, the position would be changed. Under the circumstances, the outside authority had the right to come forward and say: "We think you have not divided the profits as you should have done, and we wish to have our benefit from the undertaking put on a statutory basis also. We want to be certain of our benefit, and to be treated on the basis of one authority trading with another."

Mr. BALFOUR BROWNE then briefly replied. He should be prepared, he said, to adopt the Glastonbury clause if they would stereotype the £120,000 spoken to by Mr. Stevenson as the amount it would cost to-day to establish the gas undertaking, and give him 10 per cent. on it. The only case he knew of in which profits had been shared by a corporation with outside communities was that of Oldham, in 1887 or 1888; but that precedent had never since been followed. If the Committee would give the promoters a fair clause, he would agree to give the outside districts purchasing power.

The CHAIRMAN asked if he could give them a specimen fair clause.

Mr. BALFOUR BROWNE said he could not; but there must be provision for having the proper value of the undertaking computed by an arbitrator. If the outlying districts had to compensate him adequately, he was convinced they would not leave him; and if they did not, he should be perfectly content to go on supplying them as hitherto. If the Committee came to the conclusion that this was a fair proposal, of course, it would be easy to draft a clause, though he did not know that there was a precedent for it. The Committee must bear in mind the good character of the Corporation so far as their gas undertaking was concerned, and, secondly, they must remember that the Corporation of Doncaster had contributed £29,000 to the cost of the undertaking that they might have divided or carried to the relief of the rates. It must be recollected at the same time that only a small sum had been contributed by the outlying districts. He would ask the Committee to give the petitioners no protection except what they had proffered—viz., an undertaking that the charge for gas should be the same in the outlying districts as in the borough.

The CHAIRMAN asked if the borough would have a monopoly outside their own area?

Mr. BALFOUR BROWNE replied in the negative. The outlying districts would have the right to supply themselves not only for public lighting, but also for domestic purposes, if the Local Government Board gave them power to borrow for the purpose.

Asked if the Corporation could dispense with statutory powers so far as the outlying districts were concerned, the learned Counsel said that what the Corporation were now doing was not strictly legal; and they came to Parliament to obtain sanction to it. Outside this legal question, the position of the Corporation would be unchanged by the passing of the Bill.

The CHAIRMAN: You would have a practical monopoly?

Mr. BALFOUR BROWNE: Yes.

The CHAIRMAN: But at the same time you would have no right to supply.

Mr. BALFOUR BROWNE: Yes; and that is not good enough.

The CHAIRMAN: If you obtained your powers so far as the borough is concerned, you could still deal with these other districts by agreement?

Mr. BALFOUR BROWNE: I am not sure of that. It would only be by implication that we should have power (say) to erect a new gasholder for an out-district. Our ratepayers might object. We should not have power to collect debts, or cut off the supply—the contract would only be a private one. The Gas-Works Clauses Acts would not apply, and there would be other difficulties.

The room was cleared while the Committee remained in private consultation for some time (with Mr. Boyce, of the Local Government Board). On the re-admission of the public,

The CHAIRMAN said the Committee were unanimous in giving to the Corporation the increased limits of gas supply which they asked for. They were also unanimously of opinion that the outside authorities had no substantial or valid claim to any share of the present capital of the gas undertaking. The Committee also wished to express their opinion that the management of the gas-works and the action of the Corporation in making provision for capital expenditure from year to year out of revenue was a course which might well be followed by other corporations. For the protection of the outside authorities, a clause should be inserted providing that the consumers outside the borough should not be charged any more than the current rate inside the borough; and this was to apply not only to the private consumers, but to the street-lamps as well. They also proposed to give to the three outside authorities a purchase clause. They had considered the Glastonbury and Oldham cases, but thought that the circumstances of these places were different to those of Doncaster, and did not apply to the latter. They had also considered the purchase clause in the model form; and they proposed to depart from it somewhat, and to give a clause in which an arbitrator was to consider not the loss of profit by losing a customer, but, if purchasing powers were exercised, the arbitrator should consider the expenditure by the Corporation on plant rendered useless by the purchase by the outside authority. Counsel would no doubt be able to prepare a clause in that form.

The members of the Yorkshire Commercial Section of the Manchester District Institution of Gas Engineers assembled in goodly numbers last Tuesday, in response to an invitation from Messrs. Graham, Morton, and Co. to visit their new works at Hunslet, Leeds. As the works were recently exhaustively described in a supplement to the "JOURNAL," it only remains to place on record here the admiration the visitors expressed of the excellent organization displayed in every department of the works and offices.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Thursday, April 14.

(*Before the* MASTER OF THE ROLLS *and Lords Justices* ROMER *and* MATHEW.)

In re an Arbitration between the Chelsea Water-Works Company and the Metropolitan Water Board.

This was an appeal by the Chelsea Water-Works Company from an alternative award made by the Court of Arbitration under the Metropolis Water Act, 1902. The Arbitrators held that the undertaking of the Company ought to be valued at £3,305,700; but that if the contention of the Company as to their power to pay a further dividend on a part of their capital was right, that the sum should be £3,418,000.

Sir EDWARD CLARKE, K.C., Mr. R. B. HALDANE, K.C., Mr. E. BOYLE, K.C., and Mr. BOYDELL HOUGHTON appeared for the Company; Mr. J. FLETCHER MOULTON, K.C., the Hon. J. D. FITZGERALD, K.C., and Mr. A. B. SHAW represented the Water Board.

Mr. HALDANE said this was one of the appeals which arose under the Metropolis Water Act of 1902, and it came before the Court on a special case stated by the Arbitrators who had to determine the price to be paid to the London Water Companies for their undertakings. In the Water-Works Clauses Act, 1847, there was a provision (section 75) which prevented companies from dividing more than a certain amount of profit; the reason, of course, being that a water undertaking was a monopoly, and the Legislature thought it right to put a limit upon the profit to be made out of the public. The Chelsea Water Company were empowered to issue both ordinary and preference shares, and their Special Acts incorporated the Companies' Clauses Act, 1863. The latter contained a provision that when preference shares were issued, they should bear a dividend of 5 per cent. This provision was put in for the purpose of preventing a company from depleting the revenues in favour of the preference shareholders. The Act of 1847 imposed a limit upon the amount which the Company might distribute among the shareholders of 10 per cent. on the entire capital.

Lord Justice MATHEW: That is the then ordinary stock.

Mr. HALDANE said the Act did not say so.

Lord Justice ROMER asked whether the contention on the part of the Company was that, so long as it was a going concern, it could only pay 5 per cent. to the preference and 10 per cent. to the ordinary shareholders.

Mr. HALDANE said that was his contention. What they wished to do was to pay back-dividends. In the past they had not paid the full 10 per cent. on the ordinary shares. They had the right, under the Act, to make up back-dividends; and the question was whether, in fixing the sum to which they were entitled for doing this, they might include the whole of the capital in ascertaining the amount on the 10 per cent. basis.

Lord Justice ROMER: Your contention is, in fact, that not only may you make up the back-dividends to 10 per cent. on the ordinary shares, but also make up something beyond the limit of preference shares.

Mr. HALDANE said the Company submitted that they were entitled to make up the 10 per cent. on the whole capital, including the preference shares. They were only proposing to do this, as regards the ordinary shares, to the extent of 10 per cent., and to do it out of a sum ascertained by measuring 10 per cent. over the whole capital.

Mr. MOULTON said he did not contest the right of the Company to pay back-dividends up to 10 per cent. on the ordinary shares; but what they wanted to do was, when there had been a deficiency in respect of the preference shares, to make this up. What they wished to do was really to pay more than 10 per cent.

Mr. HALDANE said they proposed to distribute up to the limit named in section 75 of the Water-Works Clauses Act, which he contended enabled them to pay in back-dividends 10 per cent. on the whole capital of the Company right through. Having called attention to the terms of the Act under which the Company was incorporated, and the provisions made for the apportionment of the revenue between the ordinary and the preference shareholders, Counsel read the judgment of the Arbitrators, from which it appeared that the total capital of the Company consisted of £782,322 of ordinary stock, £150,000 of 5 per cent. preference stock, and £643 and £160,000 of 4½ per cent. preference stock—making in all £1,092,965; and they held that, on the true construction of their Acts of 1852, 1864, and 1875, and the Water-Works Clauses Act, 1847, the rates of 5 and 4½ per cent. on the three classes of preference stock were the prescribed rates on these stocks, and that the Company were entitled to pay as maximum dividends the sums of 10 per cent. on the ordinary stock and 5 and 4½ per cent. on the preference stock, and no more. Counsel, in conclusion, submitted that the Company were entitled to the margin between the amount which they were able to get, and that which the Legislature had prescribed as the limit.

Sir EDWARD CLARKE followed on the same side.

Without calling on Counsel for the Water Board, their Lordships proceeded to deliver judgment.

The MASTER OF THE ROLLS said the point raised by the appeal was whether, on the true construction of the 75th section of the Water-Works Clauses Act, 1847, the Company were entitled to distribute, in the shape of back-dividends among the ordinary shareholders, a sum which would result in their receiving considerably more than 10 per cent. The section provided that the profits of the undertaking to be divided in any year should not exceed the "prescribed rate," or, where no rate was prescribed, should not exceed the rate of "ten pounds in the hundred by the year on the paid-up capital in the undertaking, which in such case shall be deemed the prescribed rate." The word "prescribed," according to the second section of the Act, was to be construed as referring to such matter as shall be "prescribed

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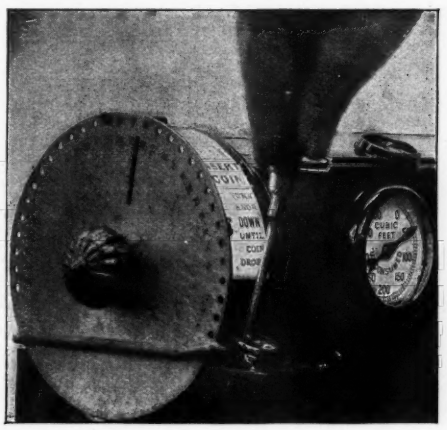

Fig. I.
Break Company's Seal and Remove Screw—THUS.

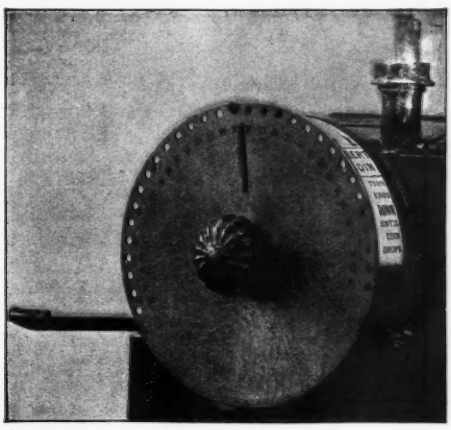

Fig. II.
Swing Band Back—THUS.

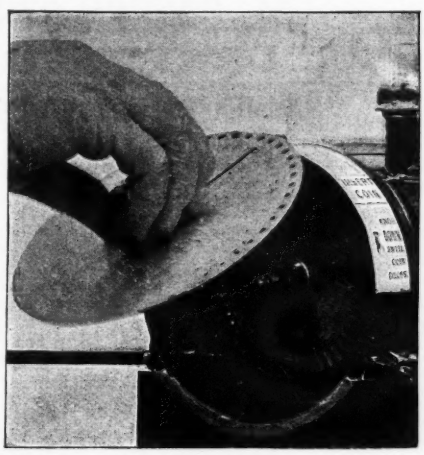

Fig. III.
Lift Plate Off—THUS.

Fig. IV.
Replace Plate—THUS.

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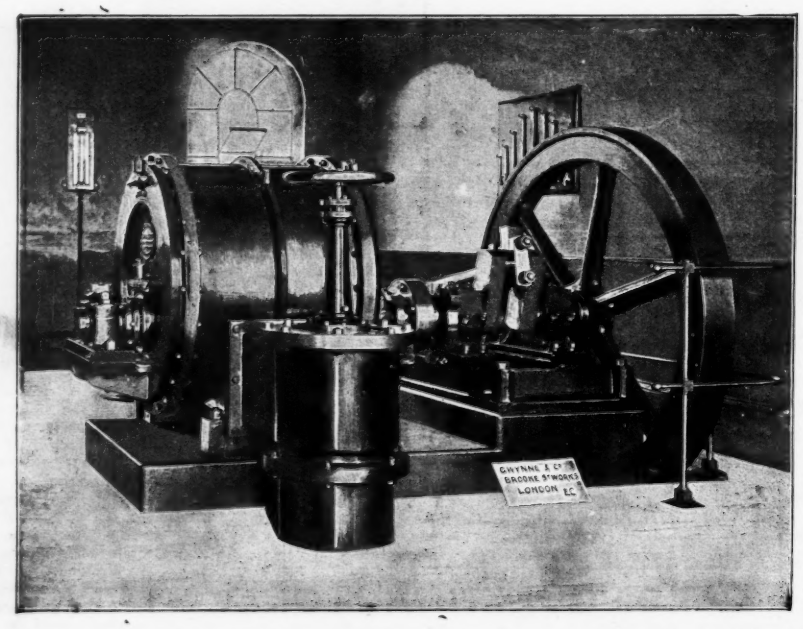

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or provided for in the Special Act; and the sentence in which such word occurs shall be construed as if, instead of the word 'prescribed,' the expression 'prescribed for that purpose in the Special Act' had been used." Mr. Haldane had relied strongly upon the words "shall not exceed the prescribed rate, or where no rate is prescribed they shall not exceed the rate of ten pounds in the hundred by the year on the paid-up capital of the undertaking, which in such case shall be deemed the prescribed rate, unless a larger dividend be at any time necessary to make up the deficiency of any previous dividend which shall have fallen short of the said yearly rate." Part of the capital of the Company consisted of the preference shares—some at 5 per cent., and a smaller proportion at 4½ per cent.; and it was contended that the only prescribed rate was the rate of 10 per cent., and that if they could show that the full amount of 10 per cent. on the whole of the capital of the Company was unexhausted, notwithstanding that a portion of the shareholders were limited, as between them and the other shareholders, to the right to receive only 5 per cent., or it might be 4½ per cent., still the sum available for distribution under the section was the entire aggregate sum of 10 per cent. upon the whole of the capital. Therefore those shareholders who had received their 10 per cent. were entitled, over and above it, to the surplus, although, as between themselves and the preference shareholders, the latter could not obtain more than the sum they agreed to take when they subscribed for those shares. Still, it was contended that the measure imposed by the statute was 10 per cent. on the whole undertaking, and that inasmuch as this had not been exhausted by reason of the fact that, to a certain proportion of the shareholders a lower percentage—viz., 5 or 4½ per cent.—had been paid, this surplus was now available, and that there was nothing in the Act to prevent it being distributed to those shareholders who were not debarred by any arrangement between themselves and the preference shareholders from taking more than 10 per cent. The statute did not cut it away from them. They had this sum, and it was distributable among the undertakers. This was the argument; and it turned upon whether or not the preference shareholders were bound by statute—whether there was a prescribed rate that defined the sum which alone could be paid in respect of that part of the capital. He thought Sir Edward Fry had correctly arrived at the conclusion that there was, for all the capital of the Company, a prescribed rate. There was one as to all the ordinary shareholders, arrived at by the above-named section, whereby 10 per cent. was substituted as a prescribed rate for the rate that was not in terms prescribed by the Special Act itself. But with reference to the rest of the shareholders, who were also undertakers, they had the fact that they were preference shareholders at the two rates of 5 and 4½ per cent.; and Sir Edward Fry was perfectly right in arriving at the conclusion that, by a somewhat roundabout process, these rates had become the prescribed rates for those shareholders. The process was this: The Special Act incorporated the Companies Clauses Act of 1863, and it authorized the raising of preference or ordinary shares. When one came to look at the provisions as to the raising of capital, it was seen that there was one which limited the dividend in the case of preference shares to 5 per cent.; and therefore, by the terms of the incorporated Act, this became the prescribed rate. With respect to that part of the capital which was raised at 4½ per cent., this rate was undoubtedly below the prescribed 5 per cent.; but the argument adopted by Sir Edward Fry appeared to be quite conclusive. The Legislature had put it into the power of the Company to issue preference stock, and to determine the rate at which the money was to be raised; and therefore it was by the exercise of statutory powers enabling them to do so that the Company fixed 4½ per cent. as the rate at which the preference stock was to be issued. From and after that time, this appeared to be an exercise of the statutory power and the prescribing of a rate under powers conferred by statute. Therefore, as to the 4½ as well as the 5 per cent., there was equally a prescribed rate. When once they got their prescribed rate, the Company had no business to distribute any sum over and above it. The surplus was for other purposes. The argument rested upon this—that, there being no prescribed rate, the Company were entitled to distribute on the footing that 10 per cent. was distributable among the shareholders until the total deficiencies of 10 per cent. dividends during the time of its existence had been made up. The ordinary shares had 10 per cent. substituted for the prescribed rate; the preference shares had the distinctly enacted limit of 5 per cent. as to one class, while there was the statutory power, which had been acted upon, to fix 4½ per cent. in respect of the others. The appeal consequently failed.

Lords Justices ROMER and MATHEW concurred.

The appeal was accordingly dismissed, with costs.

Mr. HALDANE said as the amount in question was upwards of £100,000, and the point was an entirely new one, and might cover a considerable number of cases, he would ask for leave to appeal to the House of Lords, if, on consideration, it was thought desirable.

Mr. MOULTON not objecting, their Lordships gave the permission sought.

EXETER QUARTER SESSIONS.—Monday, April 11.

(*Before Mr.* J. ALDERSON FOOTE, K.C., *Recorder.*)

Exeter Gaslight and Coke Company v. Assessment Committee of Exeter.

This was an appeal, adjourned from the previous Sessions, by the Exeter Gas Company against the assessment of their property in the parish of Exeter. There was a subsequent appeal against the rateable value of the Company's property in the parish of St. Thomas.

Mr. BOYLE, K.C., and Mr. HAWKE appeared for the appellants; Mr. RYDE, K.C., and Mr. RANDOLPH represented the Assessment Committee; and Mr. MACMORRAN, K.C., Mr. CHARLES, and Mr. DUMMETT attended on behalf of the authorities of St. Thomas.

Mr. RYDE, in opening his case, said the appellants had works which extended into the three parishes of Exeter, St. Thomas, and Heavitree. The whole of them, except the offices, were in St. Thomas; and some of the mains were there. The bulk of them, however, and the offices were in Exeter; while in Heavitree there were mains only, and these in very small proportion. Last year the rate in St. Thomas was put up, and this had disturbed the balance of payment between the parishes concerned and the rating authorities. In the parish the rateable value of the works, mains, &c., as it stood in the rate-book, was formerly £1475. Then there were sundry small ratings, amounting to £54; making a total of £1529. In Exeter, it was £3500 for the mains and £255 for the offices, or a total of £3755. The mains in Heavitree were put down at £177. This made a grand total of £5461 as the rateable value for the three parishes. Since the re-assessment, the rateable value of the works and mains in St. Thomas had been raised to £3800, with sundry small ratings amounting to £59. The amount set down for the mains and offices in Exeter remained unaltered. The figures he had given made a total valuation of £7791 for the three parishes. There was no appeal entered in regard to Heavitree, but they had to consider it for the purpose of division. The fact was, broadly, that there had been added a sum of £2300 odd to the rating of the works and mains in St. Thomas. If this valuation was correct, from the total rateable valuation of the whole there was a much larger sum to be deducted than before. The learned Counsel read a letter from the Solicitor to the Assessment Committee to the appellants' Solicitor, in which the former stated that, in order to arrive at an amicable settlement, his clients were willing to reduce the assessment to a total of £2505 in lieu of £3755.

The RECORDER asked if it was a fact that the rateable value in St. Thomas had been increased, or that hitherto it had been under-estimated.

Mr. RYDE said he did not know that it was either. It was a matter of division between the parishes. Continuing, he said that it might materially shorten his case if they knew what was the true figure for the works only in St. Thomas.

Mr. MACMORRAN said the rateable value of the works, according to his clients' idea, was £4248; but, in order to be on the safe side, they had reduced it to £3800.

The RECORDER: By what sort of process have you arrived at that?

Mr. MACMORRAN: By a regular figure on every individual building as it stands.

Mr. RYDE said he should accept the figures standing in the rate-book for the works and mains in St. Thomas, and deduct this from the figure which he maintained ought to be the rateable value of the whole undertaking. He proposed to base his arguments on the total profits actually shared by the Company as dividend in the year 1902, which gave a figure of £10,353. Owing to the latest developments of science, including the electric light, the Gas Company had been driven to compete with their rivals on the best possible terms, and one of the means adopted had been the penny-in-the-slot meter system, which necessitated the supply of the fittings for it. This had enormously increased their expenditure. Deducting the £3800, the value in St. Thomas, would leave £3102 as the valuation for Exeter and Heavitree. From this he had to deduct £177 as the value in Heavitree, which would leave £2925 for Exeter, of which £255 was for offices, which would leave £2670 as the value of the mains.

Mr. *W. A. Mason*, a member of the firm of Messrs. Headley, Mason, and Co., stated that the Company's net profit in 1902 was £10,353. The approximate cost of the slot meters up to 1902 was £3800. The Company also provided gas-fittings, the total cost for which was £2233. This had not been charged to capital, but had been paid for out of surplus revenue. There had also been expenditure on repairs. He arrived at the assessment by taking the gross profits earned by the Company in the year, and estimating that a tenant would require one-third to be deducted from this sum in respect of tenant's capital; leaving the remaining two-thirds as the extra rateable value of the whole undertaking—that was to say, the works, mains, and service-pipes—in Exeter, St. Thomas, and Heavitree.

In cross-examination, witness admitted that his method of valuation was novel, but he said it was rendered necessary by the modern exigencies of gas companies. He had put this basis forward in other appeals; but he could not point to many cases in which it had been accepted.

This concluded the case for the Assessment Committee. Mr. Charles Hunt and Mr. C. F. Jones were retained to advise them; but they were not called as witnesses.

Mr. *William Eve* said he had valued the Exeter Gas-Works on behalf of the Company. The usual figure to grant out of working expenses for tenant's capital was 17½ per cent. The witness proceeded to give details as to how he arrived at his estimate of the gross value, which he put at £12,407, and the total rateable value £4463.

Tuesday, April 12.

On the resumption of the proceedings this morning,

Mr. *Eve*, in further examination, said there was a sum of £471 odd credited to the fittings, which represented one moiety of the extra charge arising from the slot system. Doubling this amount, they had £943, which they got as the maximum price they obtained from other sources. There had to be deducted from that sum £613, shown in the accounts for the meters and repairs, which left £330. He had arrived at a total rateable value of £4463. He deducted for Exeter £255, and for the Heavitree mains £177; making a total of £432. In gas-works of this description, the cost of the mains would form one-third, and the works themselves two-thirds, of the total structural value. This left for works £2688, to which had to be added so much as related to St. Thomas, which was one-eighth (£168). This gave the rateable value of the whole in St. Thomas as £2856, and in Exeter as £1343, less the £168. Witness put in alternative figures by which the rateable value of the works and land worked out at £2627, as against £2688 on the first valuation.

In cross-examination by Mr. RYDE, witness said the first set of figures gave a rateable value for Exeter of £1175, and the second set one of £1225. His valuation was £4463.

Mr. RYDE pointed out that, as a fact, the Company had been paying

since 1894 on a total of £5129. If the witness's view was correct, the Company must have been paying for ten years on a figure at least £700 or £800 too much.

Witness said he did not admit this, because he did not know what the accounts were. In the first place, the price of gas was more.

Do you know the business of the Company has shown substantial increase during the last ten years?—No, I do not; but you may be right. Assuming the value of the Company has not increased, they paid on £600 or £700 too much. The quantity of coal carbonized in 1894 was 21,900 tons; in 1902, it amounted to 27,500 tons—an increase in round figures of 5000 or 6000 tons. This meant an increase of 25 per cent. in the gross turnover of the Company. Notwithstanding this increase, the figure on which they are paying to-day is £700 below that which they had been paying for several years.

Did you know that the capital of the Company has increased from £116,000 in 1890 to £159,000 now?—I dare say you are right; but we do not value for rating purposes according to capital.

Unless there is something exceptional, one would expect to find some relation?—Wages and coals have gone up enormously since then.

Mr. *W. A. Valon* said he had put at £80,508 the structural value of the works without the land in St. Thomas. The total value of the mains and services was £41,186, made up as follows: In Exeter parish, £20,677; in St. Thomas, £6549; in Heavitree, £3856; and in services for the whole district, £10,104. The calculation by which he arrived at his total of £41,186 was rendered rather difficult in the details, by reason of the fact that the Company was one of the very few who collected their rents half yearly instead of quarterly. Another unusual consideration was met with in Exeter—namely, the promptness with which accounts were paid to the Company for public lighting. A very large stock of coal had to be kept. The stores were constructed to hold 7000 tons; for unless they kept a large quantity, they could never be safe. They had about 6000 tons in store, and he believed that in 1902 they had more than 5000 tons. In fixing the rent of the hypothetical tenant, he had taken 7½ months' working expenses as the necessary money in hand as tenant's capital.

In reply to Mr. RYDE, witness said it would cost the Company £600 a year to collect the accounts quarterly instead of half yearly; and it would make a difference of £5000 in the tenant's capital. The Company spent a large sum in repairs and maintenance. He did not find in the accounts any amounts belonging to revenue charged to capital. His own opinion was that in these days of standard price companies they put too much to capital and too little to revenue.

Mr. *Corbet Woodall* also gave evidence for the Company. He said his capital figure for the works in St. Thomas was £81,167, exclusive of the land and of an unproductive main. A half-yearly collection was very unusual. He thought quarterly collections the better system; but the Exeter undertaking had very successfully managed. If the Directors were satisfied with half-yearly collections, witness would not suggest that they should change it. With the exception of a few details, his valuation was substantially the same as that of Mr. Eve.

In further examination, witness said it would not be safe to have less than six weeks' stock of coal in order to be prepared for a frozen canal and strikes. The charge for gas at Exeter was 3s. 2d. per 1000 cubic feet up to last Christmas, when it was reduced to 3s. He called this a low figure. He found that when the price was low, the rateable value was also low.

In cross-examination by Mr. RYDE, witness said that the increase in the sale of gas last year was 10 million cubic feet, as compared with 5 millions in the preceding year. He admitted that this was a substantial increase. His calculations were in a different form from those of Mr. Eve; but both arrived at practically the same result. Upon his basis of the value of the works, the hypothetical landlord would receive 3¼ per cent., while the hypothetical tenant would receive 17½ per cent. He considered that for the risks and responsibilities of such an undertaking, the tenant would be getting only a moderate return. One of the risks was the competition of the electric light. What was, however, mostly in his mind was the increase in the cost of materials, damage caused by explosions, &c.

The RECORDER remarked that the estimate had been made in one assessment appeal that 15 per cent. was a fair profit, with 2½ per cent. over for risks; the chief risk being that the works would not earn 15 per cent.

Mr. *W. W. Westlake*, the Assistant-Secretary of the Company, said there were 5000 accounts sent out half yearly. A quarterly collection would increase the expenditure by between £500 and £600 a year.

Witnesses was then called on behalf of the St. Thomas Assessment Committee.

Mr. *F. C. Ryde* said he estimated the tenant's capital at £30,600, against Mr. Eve's estimate of £37,000; and instead of taking six months' working expenses, he took only five months'. His figures gave a rateable value of £5404. His capital valuation of the works was £82,000.

Mr. *T. D. Dinwiddy* put the tenant's capital at £30,000, in round figures, and the tenant's share at £4803. The rateable value of the whole concern was, according to his estimate, £5635. He put the capital value of the works, &c., at £81,174, and of the land at £3700.

Mr. *H. E. Jones* valued the works, exclusive of land, at £86,800. Taken at 4½ per cent. the rateable value of the works would be £3812; the land, at 4 per cent., £148; and the unproductive main, at 4 per cent., £67. Taken at 4 per cent., the value of the works would be £3440. The principle adopted in all gas undertakings was to take the receipts, deduct the working expenses and statutories, and then distribute the rest between the works and the productive mains. It was right, in his judgment, to deal with the works in the first instance, and give a percentage upon the structural value. The amount invariably adopted was 5 per cent. on the works and 4 per cent. on the land. He thought the land was worth more than the £400 an acre estimated by Mr. Ryde. He estimated the rateable value of the hereditament at £4982.

Mr. *W. J. Battishill* stated that the land on which the gas-works stood was well worth £400 an acre.

This concluded the evidence.

The RECORDER intimated that he would fix a day for hearing Counsel's speeches in London, and give his decision at the next Quarter Sessions.

MISCELLANEOUS NEWS.

OMAGH GAS ARBITRATION.

Tuesday, April 5.

An inquiry was held last Tuesday week and two following days, at Omagh, by Mr. JOSHUA W. EDMUNDSON, of Dublin, who sat as Arbitrator between the Omagh Gas Company and the Urban District Council, for the purpose of determining the amount to be paid by the latter for the Company's undertaking.

Mr. J. GORDON, K.C., M.P., and Mr. P. C. GAUSSEN represented the Company; Mr. DENIS HENRY, K.C., and Mr. A. L. HORNER, K.C., appeared for the Council.

Mr. GORDON, in opening for the Company, traced the history of the undertaking from its inception in 1854 up to the present time. The capital, he said, was £2110; and 422 shares were issued. The Company was registered on Nov. 1, 1856, under the then Joint-Stock Companies Act. In 1878, the remaining 78 shares were issued at £2 premium. In 1879, they issued 500 shares at £5 each; so that in that year they had a capital of £5000. In 1901, the Company promoted a Bill in Parliament, and were opposed by the Council. This Bill was passed by a Committee of the House of Lords, and was discussed in the Commons. One clause in the Bill bound the Company not to oppose any Bill which the Council might promote for the purchase of the works. The Council also pressed the point as to the capital of the Company; and eventually it was fixed at £12,000. The actual property was transferred to the statutory Company. In the first three years of its existence, the Company paid no dividend, but allowed the profits to accumulate. He would give two or three illustrations of the way in which they dealt with their profits. In 1854, the profits were £279; and the Company paid out in dividends £211. In the following year the profits were £254; and they paid out £15. Subsequently, there was a steady and very substantial increase; and in 1878 they began to pay a dividend of £250 a year, which was 5 per cent. upon the capital. This was continued down to the year 1900. In one year (1899) the earnings were £708; and if it had not been for the unfortunate circumstance that the Company were mulcted in costs and damages to the extent of £342, the amount would have been £1051. The years 1901 and 1902 deserved some mention. The Company seemed to have reduced the profit in these two years to less than one-third of what appeared to have been the normal profits for the preceding five or six years; but this was entirely owing to the price of coals. The Company had been charging 4s. 7d. per 1000 cubic feet for lighting, and 4s. 2d. for manufacturing purposes; and if this was compared with the rates of other companies in Ireland, it would compare very favourably. The price in Omagh was far below the average, and nearly the cheapest of any town in Ireland. The Directors of the Company, however, did not do what they might have done during the two years of dear coal—that is, put up the price of gas. The Board might have been acting wisely or not; but they were now dealing with a progressive business, and one of the important things the Arbitrator would have to consider was whether or not it was a business that was likely to go on earning the profits that it was at the present moment. The history of the concern was one of unbroken progress from 1854 to 1903, when it earned in round figures £1000. Allowing for deductions and other matters, the earning power of the works was considerably over £1000 a year; and it was upon this basis that the value would have to be ascertained. What had the Company been doing up to the present? They had been expending a great deal of their revenue in extending and improving the business. In 1900, they expended £1948 in putting up a new gasholder. It had a capacity of 80,000 cubic feet, which could be increased 100 per cent. In 1901, they spent £1328; and in the following year £1450. This was about £4500 in three years; and everything was well equipped, and capable of supplying all requirements without one shilling being spent, except for one small item. Altogether there had been laid out by the Company a sum of £18,162; and within the last four years £5000 had been spent. In 1897, the gas made was 17 million cubic feet, of which 12¼ millions were sold, and there was a leakage of 25 per cent. In 1903, the make was 19 million cubic feet, of which more than 16¼ millions were sold, and the leakage was 13·78 per cent. In the preceding year the leakage was under 12 per cent.; and the higher figure in 1903 was probably due to alterations being made. The three sets of figures he directed attention to were—(1) the actual earnings of the Company, (2) the actual sale of gas, and (3) the saving of leakage. There was only one other point to which he wished to refer, and that was the number of consumers. Going back to the year 1893, the Company had 257 ordinary consumers; and in the year 1903 they had 338 ordinary consumers. Under the penny-in-the-slot system, they had last year 116 consumers; and the public lamps had increased from 84 in 1893 to 113 in 1903. The Company had continued to improve; and for the half year ending Dec. 31, 1903, the net profits were considerably over £600. These profits would now go to the Council. The Company were prepared to continue to supply gas under the terms of their Act; but the Council were so enamoured of municipal trading that they must get the works to themselves.

Dr. *H. B. Fleming*, the Chairman of the Company, examined by Mr. GAUSSEN, said he was well acquainted with the history of the town. There could be no question as regarded the increase in the population, and in building, and improvements of that nature. The requirements of the Company had increased largely; and the works had been carefully managed, with the exception of a couple of years. Their custom had been for some time to extend and improve the works out of the surplus profits; and the plant had been maintained in an efficient condition. New retorts and gasholders had been constructed to meet the requirements of the Company. He believed a very considerable increase could be made in the future without any considerable expenditure. Carriage of coal to Omagh was about 5s. per ton; and taking this into consideration, he believed the price of gas was as moderate

as in any other town. The expenses in 1901 and 1902 were abnormally high; the principal cause being the increased price of coal. The works were not very well managed during those years. He was not sure that they had paid a portion of the parliamentary expenses out of the profits. They were, he believed, paid by means of an overdraft. The introduction of incandescent burners, prepayment meters, gas-stoves, and gas fires had tended to increase the consumption. They had had in contemplation the making of sulphate of ammonia; and but for these proceedings, the plant would probably have been erected by now. They had also thought of introducing water gas.

Cross examined by Mr. HENRY, witness admitted that the original capital was £2110, and that it was now £12,000.

Mr. HENRY: And with the exception of the issue of stock amounting to £300 in 1874, this increase has been caused by profits made from the consumers?

Witness: Yes, it is a legitimate increase of business.

So that out of the consumers' pockets each original shareholder now has about £6 of nominal share capital?

Mr. GORDON: They did not divide their dividends.

Mr. HENRY: For each original pound the shareholders have now £6?

Witness: I think that is probable.

When you promoted the Bill in 1901, you proposed to have a capital of £15,000?—Yes.

As a result of the negotiations between you and the Council, did you agree to reduce the original capital to £12,000?—Yes; I believe we did.

In answer to further questions, witness said that the district of supply contained about 6000 persons, including the asylum, in which there were about 700 people. The asylum authorities had contemplated the adoption of electricity, but had found it too expensive. This institution was one of their largest customers; but the Company could give no guarantee that it would remain so when the Council took over the works. There was a gasholder at the asylum belonging to the Company.

Mr. *James Brodie*, who was the next witness, said he had been Manager of the works for eighteen months. The make per ton was 10,000 cubic feet; and there was a first-rate installation of retorts. Including the one at the asylum, there were five gasholders. The capacity of the new one was 80,000 cubic feet, which could be increased 100 per cent. It was in the best condition for enlargement. The capacity of the other three was 5000, 13,000, and 17,000 feet respectively; and they were all in good order. He considered it an advantage to have the holder at the asylum, as they could regulate the pressure. The capacity of this one was 5000 feet. The holders were more than sufficient for the requirements of the town, and would leave a good margin—say, 20 per cent. There were 8·18 miles of mains in the town, from 2 to 8 inches in diameter; and they had sufficient carrying capacity to supply every house in the town, and leave a margin. The pipes were in very fair order, considering the time they had been in the ground. As to the works, they were in good order; and all the appliances and machinery were in very fair condition. The scrubber required to be duplicated; and this would cost anything from £200 up. A new purifier cover was required. This would cost about £35. Sulphate plant was also needed. They could produce about 23 tons; and after paying working expenses, there would be a profit of about £130 a year. The plant would cost £800, and it might be put up for less. There had been a great demand for gas-cookers, which were a source of profit to the Company. The output of gas was on the increase, and the residuals sold well.

Cross-examined by Mr. HORNER: He considered that the holder at the asylum had twenty or thirty years' life yet. He believed it was put up in the seventies. He understood that the Asylum Committee had had the question of electric lighting under consideration, but that it was abandoned as being too expensive. The Company supplied gas for manufacturing purposes to several firms in Omagh. He heard a rumour that one gentleman intended to introduce water gas, but that it fell through. They did not reduce the price of gas to this customer; he had not any advantage over any of the others. He could not say how long some of the mains had been in the ground; but they were not useless. At present he was putting down 3-inch pipes. He had a complaint about want of pressure; but that was rectified. He did not suggest that this was partly owing to the 2-inch pipe. No stoves were returned to them. When they were put in, the consumption of gas was too great, and the people asked them to take them back; and then the Company did not charge rent for them. There would be no truth in the suggestion that they were supplying gas at a cheaper rate to persons to use the stoves. The rent of the stoves was 8s. to 12s. per annum; and this was dropped.

Mr. *William Cash*, of the firm of Cash, Stone, and Co., examined by Mr. GORDON, said he had investigated the accounts of the Company, and had gone through the books. He was examined at considerable length with regard to various tables which he had compiled, showing the original capital of the Company, the profits for the different years, and the quantity of coal purchased. He mentioned that one year the dividend decreased; but in the following year it was increased beyond 5 per cent. to make it uniform. Questioned as to the basis of purchase, he said that it should be estimated on the last year's profits. It was a growing concern; and it would not be fair to take the average as a basis on which to estimate the price.

In cross-examination by Mr. HENRY, witness stated that the way the Company kept the books was that they charged repairs and renewals to revenue, without providing for depreciation. He could not answer the question whether, if a meter were used for forty years, it would appear twice in the account as 20s. in the pound.

Wednesday, April 6.

Mr. *Hugh Smylie*, accountant, examined by Mr. GORDON, stated that he had audited the accounts of the Company since 1898. They at first were kept in a very simple manner; but it was sufficient to show the income and expenditure of the Company. He considered, however, that those who were keeping the accounts at first did not fully understand the proper way to deal with gas accounts. He considered there was a number of things paid for out of revenue that would in properly kept books be debited to capital. He had audited the accounts for the year ending December last, and gave statistics from them.

Cross-examined by Mr. HENRY, witness said that he became Auditor in the latter part of 1897; and since that date the accounts had been kept under his supervision. In the case of a new holder being erected, it would be provided for out of the revenue account. All the new gas-mains were charged to capital.

Mr. *Corbet Woodall* stated that he had made a careful examination of the plant and effects at the works, and had inquired as to the amount of gas consumed. He had also inspected the books. He considered that the works were quite adequate to supply the amount of gas required by the town. The plant as a whole was very efficient and in good order; and it appeared to have been taken care of and well kept up. The place was suitable for the works; the machinery was good and up to date; the greater portion of it being almost new; and the works were quite capable of supplying the district. He had also gone into the structural value of the buildings in every detail. All the buildings in connection with the works were efficient, and the plant and apparatus were in very good order. At the present time, the scrubber was not in good condition; and he thought another would be needed, or a washer to act in conjunction with the present one. The gas-engine was quite efficient, as also were the holders, one of which was practically new. In fact, the whole works were in perfect order, with one or two small exceptions, which the sum of about £400 would rectify. These were the scrubber and the purifying plant. He also dealt with the state of the mains and service-pipes, and went on to refer to the basis of calculation by which the purchase price was arrived at. After detailing the various items, he said that he averaged last year's earnings at £1252; and he allowed 26⅔ years' purchase, which would come to £33,386. Then he allowed 10 per cent. for compulsory purchase, which, after deducting the £1600 for land, would add £3178 to the previous figure, and would make altogether £34,964 as the value of the undertaking. He also allowed for surplus stock to the extent of £1365; and deducting £67 for deficiency, left £1299 as the net value of excess works. In addition to this, there was the land, which might be made very suitable for works, and which brought the actual value of the place to £36,304. He allowed 5d. per 1000 cubic feet of gas for renewals and repairs, and everything else.

Mr. HENRY (in cross-examination): That is to say, the shareholders will get £70 for each share?

Witness: I take that from you.

Is it not rather a curious thing that you are valuing a non-statutory Company on that basis during the time it was a statutory Company?—No; we are told expressly that we are to value it as a non-statutory Company.

As a matter of fact, are you not valuing on the figure of £1251, as if that were going into the pockets of the shareholders in 1903?—Yes.

Do you not know that the shareholders in 1903 could not touch any such sum?—No.

Will you explain any process by which £1250 could go into the pockets of the shareholders?—Taking the concern as a non-statutory Company.

Recollect you are taking a statutory year?—I am quite satisfied that £1250 was earned in 1903.

Your idea is that where an agreement is come to in Parliament, the result of which is that both sides make concessions, this should be treated as compulsory purchase?—I understand that an agreement was arrived at after the Bill had been before the Lords Committee, and before it went to the Commons.

You think that an Irish Company is in as good a position as English ones?—I see no difference.

Would you like the people of this town to give £70 for each share? Are you aware that the population has gone down from 4804 in 1881 to 4789 in 1901, though the boundary was extended?—I am not aware of that. I know the consumption of gas has gone up.

You heard that the population of the area of supply is about 6000; and, of course, a good deal as to the future of the gas-works depends upon whether the population is productive or not. Would it surprise you to know that in the area of Omagh, consisting of 5700 persons, there are 221 paupers, 734 lunatics, and 363 soldiers?—The paupers, soldiers, and lunatics burn gas.

Would you not prefer to have good, honest artisans?—I am not sure that we have not as many lunatics in London as in Omagh.

Did you ever value gas-works where the lunatics in the area were one seventh to one-eighth of the entire population?—I never did. I am sure the consumption per lunatic is as much as by the sane.

The asylum is outside the urban district. Do you think it is reasonable to capitalize the profits of a place outside the urban district at 26⅔ years' purchase, with an addition for compulsory purchase, and which any moment might stop the consumption of gas?—Certainly.

And you put the same value of security on that property as you do on the others?—Yes.

Witness was then cross-examined at some length as to the rate per 1000 cubic feet for up-keep; and, in reply to further questions, he said he had omitted to deduct the £35 11s. which had formerly been paid for gas-stoves as rent. He had allowed £360 for the six retorts as surplus stock, which he thought was quite reasonable. He had not allowed anything for the change that would necessarily have to be made in the large holder.

Mr. *Joseph Hepworth*, examined by Mr. GORDON, said that for the last two or three years he had been acting as Consulting Engineer to the Company. He had been at the works frequently, and knew them fairly well; and he also believed that at the present time the accounts of the Company were kept in a very adequate manner. Of late, it had been revised. In some cases there were charges made in the revenue account which should have been made on capital. He had carefully examined the buildings, apparatus, plant, and works, as far as he could; and he thought everything was in proper order. The machinery and all the necessary appliances were quite adequate to supply and distribute the amount of gas necessary for the district supplied; and but for the purifiers and scrubber, everything was in order. He had gone into

the value of the buildings, plant, and machinery, and was satisfied that Mr. Woodall was correct. He agreed with him that £400 expended on the works would make them quite capable of producing 25 per cent. more gas. He had also gone into the price of gas in other similarly situated towns in Ireland, and Omagh compared favourably with them. The average cost of gas was 5s. per 1000 cubic feet; and he considered that 4s. 6d. was a moderate price. He believed that the consumption of gas in Omagh would still increase at a steady rate, as the Company had developed in the last few years through the penny-in-the-slot system. He had the statement of the decrease of profits during the two years 1901 and 1902; but he attributed this almost exclusively to the price of coal.

Mr. GORDON: What do you consider a company like this is worth as a going concern?

Witness: I should take as my guide the net maintainable profits and the position of the works, which cannot be surpassed.

What then do you take as a base for ascertaining income?—I should always take the last year in works like this. We are selling, not the past, but the future; and therefore it would be radically wrong to go back on the profits of the preceding years, and it would not be right to average the last five or ten years.

What figure have you taken as bearing on the maintainable income for the year ending June 30, 1903?—I make it £1218. I believe there is some difference in these figures and those of Mr. Woodall, as he bases his calculations on renewals and repairs at 5d. per 1000 cubic feet, while I calculate them at 4½d. With the present equipment of the works, there would not be much depreciation; and the 4½d. would cover it, and keep everything in a state of efficiency.

Asked as to what he considered a proper price for the Company to obtain for the undertaking, witness said £34,850. There was £360 of this for retorts and excess stock which they did not require to use at the present time; but as the consumption still increased, they would need them soon, and he thought it a very wise thing of the Company to have them in anticipation. The increase of the consumption in the last twelve months was remarkable.

Cross-examined by Mr. HENRY, witness said that he believed 25 years' purchase was correct for a non-statutory company, provided everything was in good order and the prospects also good. He was aware that last year the valuation of the works was increased by £191, and that the rates had been considerably raised. He had noticed that it was the large consumers who took the bulk of the gas. He preferred supplying gas to a number of small customers rather than to a large institution like the asylum, as it would be more likely that an establishment like that would install electric light, while small consumers would still use the gas.

By Mr. GORDON: Generally the people had a very strong feeling about public bodies like Urban Councils managing gas-works; and he believed that the Company would better manage the concern themselves. The average price of non-statutory companies was 20 years' purchase.

This closed the case for the Company.

Thursday, April 7.

Mr. HENRY, in opening the case on behalf of the Council, said he did not intend to go into the figures at great length. Mr. Woodall and Mr. Hepworth had both pointed out that there was really no difference between a statutory and a non-statuory Company. This Company had been in existence since 1851; and a Bill had been passed by Parliament enabling them to distribute and supply gas throughout the whole of their district. Prior to getting the Provisional Order, they could not do this. In 1900, Parliament gave the Council power to produce and supply gas. The new Company was first formed with a total capital of £15,000. In the House of Lords, the purchase clause was added to the Bill; and there was a provision attached to it that the profit of the Company, after paying a dividend of 5 per cent., should be carried forward to the divisible profits of the following year, thereby forming a reserve fund which, in case the following years were not so successful, and they were not able to pay the 5 per cent. (which was the standard) was to be drawn upon. As a mere matter of agreement between the Company and the Council, the operative capital was fixed at £30,000; and the Company were allowed to sell £15,000 of their shares to the public. The Legislature said something like this to the Company: "If the Council do not want the undertaking, we will give you the statutory powers; but if they do, you will require to take all the risks of the Public Health Act." From this, it was clear that there was some meaning in the provision, and that it was to be taken as a non-statutory undertaking. The best year was taken as the basis of the number of years' purchase; while former years were not considered. As to the structural valuation, the accounts showed that the entire capital expenditure on the works down to 1903 was £18,162. In 1893, a complete sweep was made of the old plant. In 1892, £1557 was spent on machinery; and in 1893, £867. There was no allowance made for the old plant and material on the re construction of the buildings; and though there was a total expenditure in those years of £2400, no provision was made for the former machinery. The only allowance that had been made was in 1894, when £502 was set down for replacement, and £18,400 for the value of the works, which was a figure in excess of the original cost. The structural valuation was greatly inflated, even on the evidence of the witnesses. With this valuation before them, they had it that the capital of the Company, who said their shares were worth £3 each, was fixed at £12,000, which was a reduction from £15,000. The year 1903 was the only one considered as a justification for demanding 26¾ years' purchase. Owing to the expenditure on the works last year, they looked as well as possible at the inspection, and everything passed off admirably. In the four years preceding 1903, the expenditure was below the average. The maintenence of the average suburban gas-works in London amounted to over 6d. per 1000 cubic feet; but Omagh appeared to be a place where things could be done cheaper, though skilled labour was not easily obtained, and foundries did not exist. The remarkable fact relating to Omagh was that there were 8½ miles of mains, which everyone agreed was out of all proportion for a maximum output of about 17 millions. In ordinary cases, mains had service-pipes right along them; but in Omagh this was not the case. The main to the asylum was nearly a mile long. The figures given would apply to English towns; but everyone in Ireland knew the unfortunate condition of the towns there. English towns increased by leaps and bounds, and the population went up; but in Omagh it had fallen, although there was an extension of the boundary. The customers were in many instances large customers; and what would happen if they took the supply of light into their own hands? Five or six of them could blot out the whole concern. The asylum paid £400 a year, or nearly one-fifth of the entire revenue of the Company; and they might take it upon themselves to put in the electric light or erect works and make their own gas, as they could do, as the institution was beyond the Urban District boundary. There was no control over them; yet the Company asked 26¾ years purchase on the profits on the asylum. To-morrow the asylum might say they would have no more gas. They were asked to give a price that would represent the value if invested at 3½ per cent., as against the chance of the asylum and the shirt-factory stopping, and the military being removed. As to the unproductive portion of the community who did not inhabit houses and never would, they numbered about 1318 people, including paupers, lunatics, and soldiers, out of a possible 5000 or 6000 people in the town. With reference to the surplus works and the compulsory purchase mentioned, there was no compulsory purchase. When the Company introduced a Bill into the House of Lords, it was opposed by the Council; and as a result of consultation, a purchase clause was inserted. It was true that in the years 1901 and 1902 the profits fell very considerably; but this was owing to the high price of coal. This was an effect that should be provided against. Still, for the purpose of their calculation, they had rejected these two years altogether, and had taken an average of five years up to 1903, but skipped the two bad ones. Their Engineer's figures came to £16,000; being about £4000 in excess of the capital named in the Act of Parliament. He considered that this was a very liberal offer, instead of the shareholders fingering only £6000 yearly among them, and considering that the Council could take it upon themselves to enter into competition with the Company.

Mr. *A. Silverthorne*, examined by Mr. HORNER, said he had examined the works, and made a careful investigation for the purpose of structural valuation. He took as a basis the consumption and sale of gas, and also the price of coal in the town. He found that the leakage was very high. He had calculated the price at 20 years' purchase; and the valuation he made was £16,367. He had taken the manufacturing plant of the Company at £7917. In basing his calculations, he said he would not take the last year; but he would take an average of the last five years—not including the years 1901 and 1902, because the profits of the Company were low in those years, and he did not consider it would be fair to include them. The years he would average were 1897, 1898, 1899, 1900, and 1903. He considered the plant of the Company in full working order. The average profit was £822; and he multiplied this by 20 years' purchase. He considered the holders were in good condition; and the buildings were in a highly efficient state for the manufacture of gas. Some of the holders had depreciated 60 or 70 per cent. since first put up; and he calculated that the gas-lamps had depreciated by one-third. The supply of gas was increasing. In his calculation, he was taking into account that some other illuminant might be introduced, which would do away to a great extent with gas as a light; but he admitted that if this did not happen, the consumption would continue to increase. He believed that in the buildings the deficiency would be small, as they were in good order. The leakage had been greatly reduced.

Mr. *Michael Lynch*, a former Chairman of the Council, said he found it hard with his factory at Omagh to compete with other towns, owing to the price of gas. The concerns he was interested in used over a million cubic feet; and he saw no prospect of an increase, as at present it was practically impossible to use the gas for manufacturing purposes. The population of the county had gone down; and in Omagh there were a large number of vacant houses.

Mr. *Charles Metcalfe* gave evidence as to the measurement and valuation of the ground.

Mr. *John Lund*, an accountant, gave evidence as to the tables he had prepared showing the financial position of the Company.

In cross-examination by Mr. GORDON, he said that Mr. Cash had corrected only four years, while he (witness) had taken seven years. His experience was that it required about 5d. per 1000 cubic feet for upkeep. It was, however, a matter for an engineer. This figure was excluding meters, but including the taking up and putting down of roadways.

Mr. *J. H. Moran*, Town Surveyor, said he had made a plan of the works; and he substantially agreed with the measurement of the Company's Surveyor. He had also made a map of the mains and he agreed with Mr. Brodie with regard to the measurement. He had seen some of the mains, which were of cast iron. While excavating, he had seen discoloured ground, which showed that there was escaping gas. He would think that in those parts the mains would require to be relaid. There were complaints about sewer gas; but in every case he found it was due to coal gas.

Cross-examined by Mr. GORDON: You occasionally break some of these pipes?

Witness: Yes; the day before yesterday we broke one. As far as I have gone, every joint seems to be leaking.

If you had to take up the whole of the mains, it would not be a serious thing?—If we were re-laying them, we should do so at a greater depth.

Mr. HORNER, on behalf of the Council, said if he were before some some other tribunal, he would find it his duty to go through the figures and through the evidence at great length, and compare the large valuations that had been made. He did not propose to take this course in the present case, but only to confirm the few remarks made by Mr. Henry. The Council were entitled to open the roads and streets of the town; and the Company had no right whatever to do so. They were trespassers until they got their Act of Parliament. Referring to the sliding-scale, he said that when the Company increased

their dividend in one year to 6¾ per cent., which was 1¾ per cent. beyond what they were entitled to, they were bound to lower the price of gas, which would have brought it down to 3s. 4d. per 1000 cubic feet. He also pointed out that the Company had, in defiance of their Act, and notwithstanding that they had been cautioned by Mr. Shields, the Solicitor for the Council, proceeded to carry out improvements.

Mr. GAUSSEN objected to the letters being used, as they had not been put in evidence.

Mr. HORNER said he had put them in evidence when he had examined Mr. Brodie; and they were on the shorthand writer's notes. There were two forms of calculation on which the works might be taken over. One for the Company was last year's profits; and the other was an average of a certain number of years. The Company put the structural valuation at £18,162, which was more than the authorized capital; and nothing had been allowed for depreciation. Pipes and meters and retorts put down twenty years ago still appeared in the books at 20s. in the pound. Before the Committee of the House Mr. Smylie had put the valuation at £15,000 odd, which included the expenditure for the new holder; and now the Arbitrator was asked to believe that it had increased to over £18,000. He argued that 20 years' purchase, and not 26⅔, was the highest rate at which the profits could be taken.

Mr. GAUSSEN also addressed the Arbitrator, and said he wished to draw his attention to the one great issue as to whether this was not to be dealt with as a compulsory purchase. Mr. Henry and Mr. Horner had suggested inferences which were entirely fallacious. Referring to section 70 of the Act, he said the clause was inserted merely as a matter of form; and the only difference between it and the compulsory clause in other Acts was that the Arbitrator was not to have regard to the fact that the Company was incorporated by the Act. The suggestion from the other side was that the Arbitrator was to give the go-by to the principle of compulsory purchase, and treat this as a voluntary purchase. He then referred to the steps which the Company had taken to procure the Bill, and argued that any steps taken by the Council to acquire the works rendered it compulsory for the Company to sell. The case for the Company had been presented purely in the light of a successful commercial concern, and on the maintainable profits for the past year. Counsel also referred to the two years 1901 and 1902, when the profits had decreased owing to the increase in the price of coal; and he thought that the Arbitrator could come to no other conclusion than to base his calculations on the profits of last year, so as to arrive at the figure at which the Council were to purchase. He admitted that the Company did not allow for depreciation; but it must be remembered that the renewals and repairs had been out of income, and consequently they were entitled to put the concern at its full value. The income for the year 1903 had been taken very fairly as a basis; and the anticipation that could be fairly drawn was that it would increase.

The Arbitrator reserved his award.

ROYAL COMMISSION ON COAL SUPPLIES.

Evidence Bearing upon the Gas Industry.

(*Continued from p.* 108.)

At the sitting of the Commission on the 21st day (March 19, 1903), the first witness called was

Mr. WILLIAM J. CROSSLEY.

Witness opened his evidence with the following statement: The firm with which I am connected (Messrs. Crossley Bros., Limited) have used gas as a motive power since the building of the works in 1882. The whole of our premises have therefore been driven by producer gas, used in gas-engines, for over twenty years. It has been difficult to make absolute tests of the amount of fuel consumed per horse power per hour, because of the continual variation in the load upon (say) 12 engines; but after carefully comparing our coal bill with what appeared to be the average indicated horse power, we have come to the conclusion that, year in and year out, the consumption does not exceed 1 lb. of anthracite coal per indicated horse power per hour. Probably it is considerably less than this; but a certain amount of coke has to be added to the figure to provide for the steam used in the plant. The gas plant was made by Messrs. Dowson, and has given the utmost satisfaction. It has sometimes run continuously for two years without being touched—the fires never going out. We also use now a gas plant made to the specification of Dr. Mond, with added improvements of our own, which is run with bituminous coal, and which works equally well. It has been most difficult to get actual tests of the consumption of coal in the many plants we have erected, but in several experimental plants used at these works we have got the consumption down as low as 0·68 lb., 0·7 lb., and upwards, to 1 lb. of coal per brake horse power per hour; and in a recent test which we have just concluded, with an engine of 250-horse power, on a run of 48 hours, we have succeeded in giving current at the cost of 1·3 to 1·4 lbs. of very poor anthracite coal per Board of Trade unit, or (say) 0·9 lb. per brake horse power, or 0·79 lb. per indicated horse power. A careful test was made by Mr. Langdon, the Engineer to the Midland Railway, as to the cost of working the electric light at the Midland Station at Leicester with our engines. He found that the cost of fuel was 0·13d. to 0·14d. per Board of Trade unit for the year. The producers were of the Dowson make, and the engines were ours. As he would probably pay about 22s. per ton for his fuel, this would mean that he used 1·19 lbs. of coal, year in and year out, for producing this power, which would be equal to about 0·8 lb. per brake horse power, or 0·7 lb. per indicated horse power per hour. By these figures it will be seen that the production of power from fuel can be obtained much more economically by converting the coal into gas, and using it in gas-engines, than by any other means. An indicated horse power is equal to 2545 B.T.U.; and to obtain a horse power indicated in a gas-engine requires about 8500 B.T.U. to be burnt in the engine per hour. I believe I am right in stating that steam-engines require from two to twenty times this number of thermal units to give the same results. With suitable producers, a common kind of bituminous slack can be employed to make this gas, instead of using the more expensive anthracite. Such a slack can be bought at from 4s. 9d. per ton—I find this price has gone down—upwards, according to the distance of the plant from a suitable colliery. The loss of heat in converting the fuel into gas I estimate at something like 20 to 30 per cent., leaving 70 to 80 per cent. available. I assume 12,000 heat units per pound of this slack. The loss in the producer would be 3600 units; leaving 8400 for use in the engine. The loss in the engine might be taken at 70 per cent., leaving 30 per cent., or 2520 units, to be used; and this corresponds to an indicated horse power. My Company can guarantee the effective production of a horse power for a consumption of 0·875 lb. to 1 lb. of coal used in the producer per brake horse power, or 0·8 lb. to 0·9 lb. per indicated horse power according to the quality of the coal, the size of the producer, and other conditions. Using the ordinary quality of town's gas, a unit of electricity can be obtained from 20·5 cubic feet by using the gas in a good modern gas-engine; and this, if used to drive a dynamo (the gas costing 2s. per 1000 cubic feet), would give current for a cost of fuel of 0·49d. per horse power per hour. Good progress is now being made, both in England and on the Continent, in the development of gas-producers, both for large powers with bituminous coal and for small powers with anthracite and coke; and much benefit must accrue to the country in consequence by the prevention of smoke as well as by the saving of coal.

Mr. Crossley was questioned first as to the relative values of anthracite and bituminous coal for making gas. He said that in the former there was practically no tar, whereas the difficulty in using the latter had, up to within the past two or three years, been to eliminate the tar. This, however, had now been done. They could buy bituminous coal at Manchester for 7s. 6d. per ton, while anthracite cost 26s. They did not get quite so much out of the cheaper material, because anthracite was almost pure carbon; but they got more relatively to the price paid. Asked what was the minimum horse power which would justify a manufacturer in putting down producer plant in order to use gas-engines, witness said his firm put in small anthracite plants for 20-horse power, and on the Continent they were supplied largely for half this power. It was not worth while to recover bye-products in the shape of sulphate of ammonia unless there was a 5000-horse power plant. With anything from 100 up to 3000 horse power, it was better to leave sulphate of ammonia alone. Witness was asked if he had taken into consideration the question as to the amount of ash that could be used with fuel. It was suggested to him that it was rather an important matter—not, perhaps, for the immediate present, but for the future in dealing with the resources of the country—as to what coal could be economically used in spite of a large proportion of ash. Witness said that at present he did not care very much if there happened to be 10 or even 15 per cent. of ash. They often had the latter proportion. In a communication subsequently sent to the Commission, and given in a footnote to his evidence, Mr. Crossley stated that his firm had worked with coal containing 30 per cent. of ash, and believed they could use an inferior material. The percentage composition of the gas obtained from the coal he referred to was: CO_2, 6; CO, 23; CH_2, 1·9; H, 14; N (by remainder), 55·1. This would give gas of about 145 B.T.U. on the higher scale; and they usually worked with gas of 150 to 160 units. He added that he saw no reason why, under proper conditions, coal containing 50 per cent. of ash could not be burnt; and they were modifying their plant with the view of doing this. In answer to Professor Lapworth, he said that the inferior coals which it does not now pay to bring to the surface, might in the future be utilized by gas-producing plant, and energy obtained from them; and therefore these coals were, to all intents and purposes, a part of the nation's assets.

Evidence on the subject of water gas was then given by

Mr. CARL DELLWIK.

Witness began by describing the method of producing water gas and explaining its composition, and then proceeded to make the following statement: The calorific power of water gas is about 280 B.T.U. per cubic foot, or two to two-and-a-half times as much as producer gas, and about half that of ordinary coal gas. Compared with the former, water gas possesses the advantages of containing the combustible gases practically undiluted by inert constituents, and of having a higher flame temperature. The former of these qualities makes it possible to conduct water gas for long distances through much smaller mains than are required for producer gas. The cost of producing water gas is, therefore, much less for a given quantity of calorific power. It is impossible to give any general data as to the comparative degree of utilization, and consequent economy in the use of water gas, producer gas, or solid fuel, as these vary with each different application; and it is extremely difficult to obtain definite statements of results from manufacturers using water gas. The economy of production is approximately the same in converting fuel into producer gas and water gas. In each case 65 to 70 per cent. of the calorific value of the fuel may be transferred into the resulting gas. But, as already mentioned, water gas contains this calorific value in a much more concentrated, and, therefore, more valuable, form. Water gas, enriched with oil gas, has for a number of years been an important factor in the gas industry, having been employed mainly to meet extra requirements during the cold and dark season. The developments of the last few years, however, tend to give it a different position in the gas industry for the purpose of producing gas at a lower cost, and to effect a saving in fuel and labour. A moderate-sized gas-works producing (say) 300 million cubic feet of coal gas per annum would require about 30,000 tons of coal. But assuming (say) 25 per cent. of this quantity to be water gas, there would be consumed only about 22,500 tons, while the proportionate quantity of resulting coke would be reduced by only about 1150 tons.

In answer to questions suggested by his statement, witness said the cost of producing coal gas in a good-sized works would be from 1s. to 1s. 3d. per 1000 cubic feet; whereas water gas, under ordinary conditions, could be produced for about 3½d. per 1000 cubic feet. There was no difficulty, other than the cost of manufacture, in using coal gas for technical purposes. The expense of distributing water gas was considerably less than that of coal gas, because it was possible to conduct it for long distances through smaller mains than those required

for producer gas, which usually contained about 60 per cent. of inert gas, nitrogen, and carbonic acid. For the same quantity of heat conveyed, it would need two-and-a-half times as much producer gas as water gas. Asked why, in his opening statement, he had said it was extremely difficult to obtain definite results from manufacturers using water gas, he replied that it was because of the existence of trade jealousy. If a manufacturer put in plant by which he effected a considerable saving in either fuel or labour, he was very averse to making the results public. As to his reference to recent developments in the gas industry, he explained that he meant that there had been a considerable development in the use of gas for heating and cooking purposes; and in order to increase this consumption, gas had to be sold as cheaply as possible. Consequently, the cost of production must be reduced to the lowest possible limit; and in this way water gas had been applied in many places, mainly on the Continent, and in some works in Great Britain. Water gas, mixed with coal gas, did not lessen the necessity for the incandescent mantle; but it improved the illuminating power of gas with a mantle. He did not know that the introduction of water gas had caused any reduction in the selling price; but it would have that tendency finally. Whatever the cost of coal might be, water gas could be produced more cheaply than coal gas. The admixture of 25 per cent. of water gas would reduce by 20 per cent. the quantity of coal required for making the bulk, and there would naturally be a smaller amount of coke for sale. This portion of the witness's evidence not being quite clear, the following questions were put to him:—

Mr. BRIGGS: As a matter of fact, on the question of the saving of fuel to the country, we must take into account that coke, because it would have been sold cheap to someone else?

Witness: Yes; that is quite correct. If you look at it in the way of the saving of fuel to the country, and supposing all the coke to be used to advantage in that way, this would represent a portion of the saving.

The CHAIRMAN: As I understand, you would undertake to make the same quantity of gas with 22,500 tons of coal as was formerly made with 30,000 tons, but you would have 1150 tons of coke less to sell?

Mr. BRIGGS: More than that.

Professor DIXON: You would not have the coke from the other 7500 tons of coal, because you never would have bought that coal.

Witness: In the one case—say it was all coal—there would be about 15,000 tons to sell altogether; in the other case, there would be 11,250 tons, less the 1150 tons.

Mr. BRIGGS: So that you would have 5000 tons less coke to sell, but you would save 7500 tons of coal?

Witness: Yes. Then, of course, there would be the other bye-products as well. They would be lost—or rather they would not be produced.

Sir G. ARMYTAGE: What is the value of the bye-products of a ton of coal?

Witness: I really could not say off-hand. The saving would not amount to very much.

Witness was next questioned as to the number of installations of water-gas plant, both for gas making and technical purposes, in England and abroad; and then his attention was directed to its use for motive power. Professor Dixon asked whether, when water gas was mixed with coal gas, it altered the nature of the combustion of the latter—as, for instance, in its explosion in the cylinder of a gas engine. In other words, did its presence make it more difficult to use coal gas in engines? Witness replied that no alteration was needed to the gas-engine; but it might consume a very slight quantity of gas more. He added that there were several places where gas-engines were used with blue water gas without any admixture of coal gas, and no alteration was made in the engines, except that the gas-ports were opened a little, so as to admit a larger quantity of gas. After some further questions on this subject, reference was made to the witness's blue water gas, and he was asked if he could enrich it with benzol so as to bring it up to 18 or 16 candles, or what was convenient. He replied that he should not recommend using the gas alone benzolized, because then the quantity of benzol would be too great for it to carry. It was only in admixture with coal gas that he would recommend it. When they wished to use water gas alone, it was far better to carburet with oil. Benzol, however, being cheap at present, it answered the purpose very well. Asked if it was his view, as Sir George Livesey had told the Commission, that in future the illuminating power of gas could usefully be brought down and cheapened, he said he thought there was not the slightest doubt that the tendency was that way, and that the use of mantles with a very much poorer gas would give all that the public needed. Consequently, enrichment would not require to be very large in any case with blue water gas.

At an earlier stage of the inquiry, some interesting information was furnished to the Commission on the subject of coke-ovens and the recovery of bye products therefrom by

Mr. JOHN H. DARBY, M.Inst.C.E.

The following are some extracts from Mr. Darby's statement: Coke-ovens may be divided into three types—the beehive, the retort-oven without recovery of bye products, and the retort-oven with recovery of these residuals. Generally speaking, no bye-products are obtained with the first type of oven, and there is a waste of 10 to 15 per cent. of the fixed carbon in the coal. These ovens often produce from 7 to 8 tons of coke per week. They demand little attention in burning, produce first-rate bright and dry coke from good coking coals, but are extremely wasteful. To produce 1000 tons of coke per week, the outlay, without boilers, would be about £5760; and with boilers, hearth, flues, sidings, &c., an average cost would be £5760, *plus* £3000 for boilers and £4720 for hearths, sidings, &c., or a total of £13,480. In beehive ovens, 1000 tons of coke are equal, at 54 per cent. yield from 30 per cent. volatile coal, to 1850 tons of fuel; in non-recovery ovens, at 64 per cent. yield, 1560 tons of fuel; in recovery ovens, at 68 per cent. yield, 1470 tons of fuel. Therefore, in producing 1000 tons of coke per week, the beehive ovens burn or waste $1850 - 1470 = 380 \times 68$ per cent. = 258 tons of fuel, which, at 14s. 6d. per ton, means a loss of £187 per week, or £9350 per year of 50 weeks. The non-recovery retort-ovens are best suited for fuels so low in volatile constituents that it does not pay to collect the bye-products. The yield of coke from them is good, the ovens are simple in construction, and for a production of 1000 tons of coke per week the average outlay will be about £15,200. The fuel burnt or wasted in these ovens in producing 1000 tons of coke per week would equal 63 tons per week, worth, at 14s. 6d. per ton, £2250 per year of 50 weeks. The bye product or recovery ovens produced in 1902 about 1,045,000 tons of coke, or approximately 10 per cent. of the total production in the United Kingdom. From coal yielding 10,000 cubic feet of gas per ton, and having a calorific value of 480 to 500 B.T.U. per cubic foot, there are from 3000 to 4000 cubic feet of spare gas per ton of fuel coked. This amount, given off over 24 hours, multiplied by 7 tons, the quantity of fuel per charge, equals, if burnt in a gas-engine, about 40 brake horse power per oven. My experience goes to show that each description of coal must be examined by itself, and treated as occasion demands. No hard-and-fast line can be laid down as to which is the best method of coking. It is a fact, however, that many fuels not previously considered as coking coals may be made into useful coke under conditions suiting their composition. With regard to bye-products, rich bituminous gas coals usually give the highest yield of tar, ammonia, light oil, and surplus gas. From 16 per cent. of volatile matter upwards, the yield of bye-products increases; and at from 30 to 32 per cent. the limit is reached. With a rich coking coal of this description, the present net value of the bye-products, after deducting the cost of collection, amounts to upwards of 5s. per ton of coke. I have had experience of rich coals yielding 5 to 6 per cent. of their weight of tar, 37 lbs. of sulphate of ammonia, and 31 to 33 gallons of 65 per cent. naphtha per ton. For a production of 1000 tons of coke per week, including bye-products plant complete, the average outlay would not be less than £40,000. The coke burnt or wasted in the ovens is *nil;* and the average net value of the bye-products from 1000 tons of coke amounts to £250 per week—£12,500 per year of 50 weeks. Compared with the beehive oven, therefore, for the same production of coke, there is a saving of £9350 (the value of the coke wasted) + £12,500 = £21,850 per annum—the costs of erection being £13,480 in the case of the beehive, and £40,000 in case of the recovery oven. The above values are for a rich 30 to 32 per cent. volatile coal. The returns in bye-products from a 16 per cent. volatile coal would not probably be half those stated. With well designed and well constructed recovery ovens, repairs are not excessive.

The portions of witness's statement which elicited questions of most interest to our readers are those relating to the residual products of coke-ovens. In answer to the Chairman, he stated that when he said that while no hard-and-fast line could be laid down as to the best method of coking, it was nevertheless a fact that many fuels not previously considered as coking coals might be made into useful coke under conditions suiting their composition, he meant to refer to the methods of cleaning the coal, washing and grinding it, compressing and coking it in ovens that seemed to suit its character. As a general proposition, coal which could be used for coking had a greater value than that which could not; and therefore any process by which it could be made available for the purpose had the effect of raising the value of the coal. Asked by Mr. Bell whether he thought it was the appreciation of sulphate of ammonia as a fertilizer led the Germans to develop bye-products ovens, witness said he considered it was partly due to this. Ammonia, not only as sulphate but in other forms, was required; and the development of these ovens was a consequence of the desire to obtain it. Mr. Bell then asked witness if he knew whether a fear had arisen of there being an over-supply of sulphate of ammonia in the event of this method of utilizing small coal being adopted to a large extent. For example, supposing 10 per cent. of this kind of coke were converted into 25 per cent. within the next two or three years, would there be an increasing demand for bye-products? Witness replied that there had been a growing demand for sulphate of ammonia; and, of course, in many ways this was affected by the agricultural question—as to whether they could buy the material. In his experience, there had been no trouble to sell sulphate of ammonia.

Passing to another part of witness's statement, the Chairman asked him whether, in addition to the recovery of the bye products from coke-ovens, further economies would result by the use of the waste heat or spent gas for power purposes. Witness replied that the fuel in the oven takes about 6000 cubic feet of gas per ton to heat the ovens themselves, and the waste heat from the combustion of the gas is taken up in the boilers. Of the remainder, 4000 cubic feet—assuming the coal yielded 10,000 cubic feet per ton—would be available in any direction required. For instance, by burning this fuel in a gas-engine, one could get a large amount of power—a valuable bye-product—from the plant. Assuming that an oven carbonized 7 tons a day, it would be worth about 40-horse power on the engine-shaft for the whole period it was working. He explained that one oven could not be taken by itself, but a battery of ovens coming together could. The gas from the ovens was of rich quality—not like producer or Mond gas, but approximating that supplied in towns. It must be got rid of as it was made; and, as a matter of fact, it was being used as fuel in gas engines, for which it was admirably adapted, especially for electric lighting At his works, they were generating a great deal of energy in this way; plant being put down to provide for 1000-horse power by gas-engines supplied from the ovens themselves. The gas was conveyed in large pipes, which in their way were really gasholders, to the engines, and used direct. If the engines stopped, the supply of gas was wasted. This was quite a considerable installation—in fact, it would be sufficient to light a fairly large village.

Liverpool and Water Gas.—Referring in the Liverpool City Council to the report of the Lighting Engineer (Mr. C. R. Bellamy), which was noticed in the "JOURNAL" for the 5th inst, Alderman Watts said he saw that the water gas supplied by the Gas Company was still very impure; and, what was worse, the impurities of this "wretched stuff" were dropped down upon Wavertree. He wished to know what steps were being taken to protect the lives of the people. The report was an excellent one; and it was satisfactory to find that the Lighting Committee had given the city three times the amount of illumination they formerly did, at a less cost of £10,000.

UTILIZING GAS RESIDUALS AT LEEDS.

Discussion in the Council.

Some discussion took place at last Wednesday's adjourned meeting of the Leeds City Council with reference to the minutes of the Gas Committee, which included a recommendation for the acceptance of tenders for plant for brick and slab making. The minutes also referred to a letter from Alderman Lowden and Mr. John Bond, offering the right of using their inventions for the utilization of waste or spent lime and clinkers for the purpose of making bricks and slabs, and stated that the offer had been accepted by the Residuals Sub-Committee, who had recommended that the cost of the plant should be paid for out of the revenue account.

The adoption of the minutes having been formally moved by the Chairman of the Gas Committee (Alderman Lowden), Mr. Wilson proposed, as an amendment, that the whole of the minutes relating to the plant should be referred back for further consideration. It was, he said, practically setting up the municipalization of a new industry, without direct authority from Parliament. He believed there had been permission from the Council to spend £200 in experimenting on this matter, but over £1000 had been spent. Alderman Lowden remarked that both these figures were incorrect. Mr. Wilson said he objected to the principle of the ratepayers' money being taken to experiment with the patents of private persons. It seemed to him that, if some protest was not made, the Council were going to be landed in a dilemma. It was a distinct weakness that the proposal was to take the cost of the plant out of revenue instead of capital. Alderman Willey suggested that the minutes in question should be left out altogether. He was surprised that any Committee should pass such a resolution. He questioned whether the Gas Committee had power to make bricks and slabs; and even if they had, he thought it would be inadvisible to do so. They did not know where this thing might end. Mr. Wilson further remarked that Alderman Lowden was Chairman of the Committee; and it was contrary to the Municipal Corporations Act for him to benefit, directly or indirectly, from the patent. He thought Alderman Lowden would be well advised to get out of the matter as quickly as possible. The Town Clerk, on being appealed to, ruled that the matter did not come within the Municipal Corporations Act; and he pointed out that the Private Acts of the Corporation gave them general powers to manufacture products from residuals. Alderman Lowden said that what he and Mr. Bond proposed to do was to give the benefit of this patent to the city in perpetuity, without any charge or cost of any kind to the Corporation. Alderman Tetley declared that Alderman Lowden had rendered a great service to the city in enabling them to make use of their gas lime, which otherwise would cost them 3s. a ton to get rid of; and several other members also spoke in favour of the adoption of the minutes, while Mr. James and Mr. Armitage held that, as public money was spent on the experiments, the profits of contracts with other corporations should not go to the patentees.

Alderman Lowden, in reply, referred to the resolution of the Council which had authorized the Gas Committee to expend money on experiments in revivifying gas lime. Some £625 had been spent, including £98 on labour. The patent referred to was not for making bricks and slabs, but for making the materials out of which these could be manufactured. What he had done was to provide means for producing from a worthless material something useful. Mr. Wilson: At the Corporation's expense; and you annex the patent. Alderman Lowden: I am going to enable you to save between £2000 and £3000; and am placing at the disposal of the Corporation something to keep down the rates. Mr. Armitage asked whether the patent taken out for revivifying gas lime was the result of money expended by the Corporation. Alderman Lowden: Brains enter largely into the matter.

The amendment was lost by 27 votes to 10; and the acceptance of tenders by the Gas Committee for brick and slab making plant, to the amount of £3649, was afterwards approved, with the addition that "the Town Clerk be instructed to borrow the money accordingly," instead of taking it from revenue. Mr. Wilson said if the Local Government Board approved the loan, he would be satisfied as to the legality of the brickmaking.

INCANDESCENT GAS LIGHTING IN MARYLEBONE.

Altering the Position of the Lamp-Columns.

In a report issued last Tuesday, the Lighting Committee of the Marylebone Borough Council state, in connection with the installation of the incandescent system of gas lighting throughout the streets of the district, that Messrs. Pontifex and Co., the Contractors, had contended that their contract did not include the extension of the connection from the existing service to the point at which the lamp-columns are to be set back; the reason given by them being that the Gaslight and Coke Company had always strongly objected to any contractor interfering with their services, and had always insisted upon making the connections themselves. Messrs. Pontifex, however, informed the Committee that if the Council were able to persuade the Company to allow them to do the work, the difficulty could be easily overcome, as it would cost no more to alter the services when they had already stripped them in order to remove the columns. The Committee therefore communicated with the Company with regard to the matter, and had received a letter from Mr. F. W. Goodenough, the Chief Inspector, stating that they would consent to the Council's Contractors making the necessary connections and extending their services to the public lamps, but only on the condition that the Company's servants were present at each job to pass the work before the ground was filled in, and that three days' notice should be given to the Company's Distributing Engineer (Mr. G. F. L. Foulger) before the commencement of operations, and daily notice to be sent him of where the Contractors would be at work during the ensuing day. It was pointed out that it was imperative that the Company's men should be present in every case, as it was certain that in some instances the service would require renewal, while in others the proximity of house services would necessitate special precautions being taken to avoid accident or damage to property. The Company's charges for attending upon and watching the Contractors, &c., would be only 2s. per service. The Committee subsequently interviewed Messrs. Pontifex and Co. with regard to the payment of this charge, and finally accepted an offer from them to undertake the entire work of setting back the columns 12 inches from the cuter line of kerb, disconnecting and reconnecting the services after removal, pay all the Company's charges, and carry out the reinstatement of all pavings of footpaths and roadways disturbed in connection with the work, including the provision of new kerbing where necessary, for the sum of £1 per lamp-column.

ELECTRICITY v. GAS AT HASTINGS.

The Hastings Town Council have been exercised on the subject of the lighting of one of the roads. The Public Lighting Committee first of all decided to have four incandescent gas-lamps put up; but subsequently finding that there was an electric cable in the road, they changed their minds, and recommended the Council to have incandescent electric lamps at a cost of £3 10s., against the Gas Company's £3 7s. For this sum the Company would have provided all-night lighting of 50-candle power; while the electric lamps will only yield 16 candles. Apart from the difference in the amount of light, as the equivalent of the town dues represents about 2d. per 1000 cubic feet of gas and the rates about 1½d., the net cost to the town with the incandescent gas system would have been really 4s. 4d. less than that given above on the annual consumption of 15,000 cubic feet per lamp. Of course, the reason for the change of front on the part of the Committee is apparent when it is borne in mind that the Corporation have in their hands an electric light undertaking on which there is an adverse balance; and when moving the adoption of the recommendation, Mr. Pelham expressed the wish that the Chairman of the Electric Light Committee and the Borough Electrical Engineer would "buck up and make the department pay," and then the Lighting Committee would, he said, have a little more encouragement in recommending the extension of the electric light in the town. Alderman Langham seemed to have a twofold source of delight in supporting the recommendation; saying that even if the Council paid more for the light, they would be lessening their adverse balance, and "saving every halfpenny they would otherwise pay the Gas Company." An endeavour was made to defer the matter; but in the end the proposition of the Committee was agreed to.

ELLAND ELECTRIC LIGHT EXTENSIONS.

The Gas Company's Opposition.

In the course of a Local Government Board inquiry which was held at Elland last week, an interesting conversation took place between the Inspector (Mr. E. A. Sandford Fawcett) and Mr. Parker, a legal gentleman who appeared on behalf of the Gas Company. The District Council are desirous of borrowing, in addition to the outstanding loans of £44,295, a further sum of £4000 for the purpose of extending the electricity mains for public and private lighting; and the Gas Company, in their position as very large ratepayers, decided to oppose the application.

The Consulting Electrical Engineer (Mr. Walter Emmott) stated that the extensions proposed were foreshadowed two years ago. Basing his calculations on the present state of affairs, he anticipated that the electric lighting works would be a paying concern in eighteen months from the 1st of January last. His estimates of two years ago had been fully borne out by the results. In reply to Mr. Parker, he acknowledged that he based his estimate on 6000 8-candle lamps burning 12 units each per annum, and that at present there were only 4500 lamps; but these were burning 13 units per annum. They had, however, other customers in the proposed new area who were anxious to be supplied. The Inspector asked Mr. Parker what was the object of his opposition. Mr. Parker: I oppose because the money already spent should be shown to be remunerative before any further borrowing powers are granted. The Inspector: The object of your opposition is perfectly obvious; but I think you may confine yourself to a statement without cross-examining Mr. Emmott. Mr. Parker: I do not think that quite fair. The Inspector: There we may differ. I shall be glad to take any statement you may make, and place it before the Board. Mr. Parker: My point is that the whole of this scheme has been inflated; that the original estimates were not sound; and that the present estimates are not sound. The Inspector: On what grounds? Mr. Parker: First of all, the original estimate of receipts was based upon 6000 8-candle lamps upon the then expenditure; and it is admitted there are only 4500 lamps. The Inspector: But there is nothing to prevent additional lamps being put on the existing mains. Mr. Parker: That may be; but I hold they should not be allowed to go to additional expenditure until they have made what they have spent remunerative. The Inspector: The policy of the Gas Company. I mean, a scheme of this sort must be extended, if it is to pay. I think it is obvious. Mr. Parker: It may be extended; but it should not be done now. The Inspector: The only position you can take is that the current is not required.

Mr. Emmott then said they had applications for 2100 8 candle lamps in the area where it was proposed to carry out the extensions. Mr. Parker: Can you give me details? Mr. Emmott: No; the Resident Engineer declines to give the names, or the Gas Company may use their influence against the light. Mr. Parker said that so far as the profits of the Gas Company were concerned, it could make no difference, for they were now paying their maximum dividends. What they objected to was that, as ratepayers, they should be called upon to make good any loss upon the electricity undertaking; and they asked that the Council should hold its hand. The Inspector: It was suggested at

the original inquiry that the Council should not start at all. Mr. Parker: It would have been well if that advice had been followed; but because the Local Authority have been allowed to go to this expense, there is no sound reason why they should be permitted to go further until they have proved that the first step was a wise one.

Subsequently the Vice-Chairman of the Council (Mr. J. F. Crossland) supported the application; and the proceedings concluded with a vote of thanks to the Inspector.

SALES OF STOCKS AND SHARES.

At the Mart, Tokenhouse Yard, last Tuesday, Mr. Alfred Richards disposed, by order of the Directors, of £10,000 of additional 5 per cent. ordinary stock of the Hastings and St. Leonards Gas Company at £118 to £121 per £100 of stock. On the same occasion, some ordinary stock of the West Ham Gas Company (last dividend 5 per cent.) sold at £101 per £100; a parcel of the West Surrey Water Company's ordinary shares at £16 2s. 6d. to £16 5s. each; and 85 ordinary £10 shares in the Barking Gas Company at £13 per share. On the same day, Messrs. Edwards, of Newcastle-under-Lyme, sold by auction, at the North Stafford Hotel, Stoke-upon-Trent, such an amount of consolidated new ordinary stock of the Staffordshire Potteries Water-Works Company as would realize £11,000, and such an amount of 3½ per cent. debenture stock as would realize £7000. The ordinary stock fetched prices varying from £181 to £173 per £100—the average being about £175. For the debenture stock, £102 was the highest price obtained. The tenders for the new issue of £50,000 of ordinary stock of the Newcastle and Gateshead Gas Company were opened on Wednesday, and the amount has been allotted at an average above the minimum price (£105 10s. per cent.). At a recent sale in Leeds, Messrs. Hollis and Webb disposed of 11 shares in the Drighlington and Gildersome Gas Company for £7 5s. each; 35 original shares in the Crossgates, Halton, and Seacroft Gas Company for £12 10s. each; and £10 original stock, £60 of "B" stock, and three new shares, £3 paid, in the first-named Company, put up in one lot, for £146. The principal lots in the catalogue consisted of an issue of £3000 of additional capital, entitled to a maximum dividend of 7 per cent., in the Crossgates Company. The first 30 shares realized £10 10s. each; and the price gradually rose to £10 15s., falling afterwards to £10 13s. 6d., and finishing at £10 14s. 9d. On Wednesday, Mr. J. A. Locke sold some "B" shares in the Leamington Priors Gas Company at £37 10s. each.

METROPOLITAN WATER BOARD.

Financial Matters—General Management—Compensation to Directors.

A Meeting of the Board was held on Friday, at the offices of the Metropolitan Asylums Board—Mr. R. M. BEACHCROFT in the chair.

Letters were read from Mr. T. M'Kinnon Wood and Mr. E. A. Cornwall, representatives of the London County Council, resigning their offices as members of the Board.

The Finance Committee presented a report in which they stated that they had had under consideration a report from the Accountant with reference to the collection of the water-rates in the districts of Tottenham and Enfield after the "appointed day." In the Tottenham district 13,069 hereditaments and in the Enfield district 8384 hereditaments were supplied. The Board were bound to charge the water-rate on the principle laid down by the New River Company's Acts, which differed very considerably from the practice adopted by either of the District Councils. It seemed to the Committee to be of paramount importance that the charges of the Company should be enforced with uniformity in both the districts concerned, for, if differences were permitted to arise, confusion would ensue and injustice possibly would be done to other consumers in the same area of supply. The Committee recommended—"(*a*) That the Board do concur in the opinion that it is expedient that the collection of the water-rates in the urban districts of Tottenham and Enfield should be made by officers to be employed by the Board; and that it be referred to the General Purposes Committee, after consultation with the Finance Committee, to report with reference to the number of collectors to be engaged, and as to the salaries, conditions of appointment, &c., attaching to the offices. (*b*) That the Finance Committee be authorized to make all arrangements with the New River Company for the preparation of the standard rental." The Committee reported further in regard to the management of the redeemable and irredeemable debenture stocks, including transfers and payment of interest. The total amount of the debenture stocks which would be transferred to the Board was about £11,300,000, and from the appointed day the Board would become responsible for their management. The Committee submitted the following, among other recommendations: "That the management of the debenture stocks, both redeemable and irredeemable, including transfers and payment of interest, should be transferred to the Board's Central Offices."

The several recommendations were agreed to.

The General Purposes Committee reported that the Board on the 18th ult. referred back to them, for further consideration and report, their recommendation that the duty of general supervision should be entrusted to the Chairman of the Board and the Vice-Chairman. The future work to be performed had now been divided between four Committees, corresponding to the four departments or branches which might be expected to be formed—viz., the Clerk's, the Engineer's, the Accountant's, and the Legal Department. Each of these Committees would be responsible to the Board for the successful carrying out of their duties—the Board, of course, exercising supreme authority; and each Committee had its Chairman, who devoted considerable time to the work, and was in close touch with the departmental officer. Equally was the Chairman of the Board regularly accessible to, and in communication with, the Chairmen of the different Committees and the departmental officers. In view of these matters, they had, after careful consideration, arrived at the conclusion that it was not necessary to ask the Board at present to make any special provision for the general management of the undertaking other than that which now obtained; the organization already adopted, by the division of the various branches of the work among the four Committees, being, in their opinion, sufficient for the present purposes, coupled with the fact that the Chairmen of Committees and the Chairman of the Board maintained close touch with all matters of importance. They recommended that the Board should concur in this view.

This was agreed to without discussion.

The Special Arbitration Committee reported in regard to compensation to Directors of the Water Companies, that, under the provisions of section 48 of the Metropolis Water Act, 1902, the Board were required to pay to each of the Companies, by way of compensation for the loss of office sustained by such of the Directors as were in office both at the date of the publication of the notice for the Bill for the Act and on the appointed day, such sum as might be agreed upon between the Board and the Companies, or, in default of agreement, as might be determined by an Arbitrator appointed by the Local Government Board. The Committee suggested that, inasmuch as an arbitration may be involved in the settlement of this question, the Board might consider it expedient that the matter should be referred to the Committee to deal with; and they had therefore been in communication with the General Purposes Committee on the subject. That Committee had informed them that they concurred in this view. They therefore recommended—"That the question of compensation should be referred to the Special Arbitration Committee; that the Committee should be empowered to take all requisite steps in connection with any arbitrations therein; and that the resolution of the Board of March 18, 1904, empowering the Committee to incur expenditure not exceeding £7000 in respect of matters arising in connection with the arbitration proceedings, should be extended so as to include in such proceedings any arbitrations under section 48 of the Metropolis Water Act, 1902."

The Board adopted the recommendation.

THE TEES VALLEY WATER BOARD.

The Deficiency in the Accounts.

At last week's Meeting of the Tees Valley Water Board, Colonel S. A. Sadler, M.P., said that the Finance Committee of the Middlesbrough Corporation had been discussing their position in the estimates, which showed that something like £1500 would be required from them towards making up the deficiency in the Board's accounts. He asked whether he was correct in assuming that this expenditure was on capital account; so that, instead of sustaining a loss of £1500, there was actually a profit to the Middlesbrough Corporation on the year.

The Chairman (Alderman Hugh Bell) said that for the money taken out of the pockets of the ratepayers they had a valuable asset in their water-works, especially if, as he believed, the district had still a great future before it. In their action in purchasing the water undertaking, they might, he believed, have saved a quarter-of-a-million. Circumstances, however, prevented it. What was their condition two years ago? They alone, of all the towns in the North of England, were never hampered in their water supply. This was a great deal to say; and it was worth giving something for. They might think it seemed hard that the ratepayers should pay for what the manufacturers benefited by; but after all, on the prosperity of the manufacturers depended the prosperity of the ratepayers. If the money for the water-works had not been taken quite out of the pocket from which it ought to have been taken, the ratepayer would still have been the person to suffer most if the work had not been proceeded with. Works could shut down, and suffer nothing but loss of interest; but when employment stopped, the people who failed to get work suffered much more than the factories which were closed. It was for this reason that a charge of 2s. 6d. had for over 25 years been imposed upon the ratepayers as insurance against such disaster as the stoppage of the works of the district for want of water. It was true they had taken £58,000 out of the ratepayers' pockets; but they got no credit for what they put in. They had reduced the charge. Had the Water Company who supplied the district before the Corporations took over the undertaking been in existence now, making the charge that they did make, they would have been paying £4000 per year more than they were at present. He could not guess what the Company would have done under the same circumstances as were met by the Board; they might have reduced their charges. Supposing they turned to and valued their water-works properly, he would undertake to say that they would stand at 30 per cent. premium. What the ratepayers had suffered was so overweighted by the benefits they had gained, that he (the Chairman) would willingly do again what he had done in the past.

After a little discussion, the matter dropped.

LOUGHBOROUGH NEW WATER-WORKS.

A Dispute with the Contractors.

The Chairman of the Loughborough Water Committee (Mr. J. Cartwright) explained to the Town Council last week why it was that the operations in connection with the new reservoir at Blackbrook were at a standstill. He said that for a long time past the Water Committee had not been satisfied with the progress of the works, and numerous protests had been made to the Contractors on the subject. The contract provided that the whole of the work was to be completed by March, 1903; and the price was £58,000. At the end of four years, and twelve months after the contract should have been completed, the value of the contract work done amounted to only £20,000—or considerably less than half. During the past few months matters had got worse; and the Committee, being dissatisfied with the slow rate of progress, had instructed the Town Clerk to call the attention

of the Engineers to the subject, and to request them to use every endeavour to accelerate the work. At a meeting of the Committee last February, the Engineers (Messrs. G. & F. W. Hodson) attended, and reported as to the delay. Subsequently an interview took place between the Contractors and Messrs. Hodson, when the former definitely stated that they would not quarry any more stone either from the quarry near the dam or the One-Barrow quarry, unless fresh terms were arranged. They stated that the plum concreting was costing them much more than the concrete price; and in consequence of the loss they were sustaining on this part of the contract, they desired an alteration in the schedule price for plum concrete from 13s. to 21s. 2d. per cubic yard, which would add at least £8000 to the contract price. If their application was not acceded to, they stated that they would not go on with the work. The Committee declined to pay the Contractors any increased price over and above the contract rate; and the Town Clerk was instructed to take Counsel's opinion on the position of the Corporation, and particularly as to their rights and liabilities under the contract, and the steps which should be taken to complete the work. Subsequently the Committee, on the advice of Counsel, directed the Engineers to give notice to the Contractors of the intention of the Council to employ other persons, by contract or otherwise, to complete the work. The Committee further instructed the Town Clerk, at the expiration of the notice, to inform the Contractors that the Corporation declared that the agreement between them had become void as to the Contractors, but without prejudice to any right of action by the Corporation to which the Contractors might be subject for any voluntary neglect to proceed with the execution of the work pursuant to the contract. These notices had now been given; and the Corporation had taken possession of the works and plant. The Committee would at an early date report upon the steps which they were prepared to advise the Council to take for the completion of the reservoir.

Witham Water Supply.—Mr. E. A. Sandford Fawcett, Assoc.M. Inst.C.E., a Local Government Board Inspector, held an inquiry at Witham a few days ago, respecting the application of the Urban District Council for sanction to borrow more money for the purposes of water supply. The Clerk to the Council (Mr. W. B. Blood) said the assessable value of the district, comprising 3454 persons, was £11,335, and there were outstanding loans amounting to £13,981. The application was for power to borrow £2000 for new works; the total estimated amount being £2065 4s. 10d. The Engineer (Mr. F. S. Courtney, M.Inst.C.E.) said the works had been commenced and almost completed, with the exception of the manager's cottage, the contract for which was let. The works would be entirely completed by June 21. The boring was 600 feet deep, and went into the chalk. The yield at the trial pumping was at the rate of 180 gallons a minute. No opposition was offered.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Apart from the fact that it was the twenty-first anniversary of the Informal Meeting, and that Mr. M'Gilchrist was in the chair, it is difficult to find anything to write about the meeting on Thursday which has not been written of previous meetings. There is, and has been during all my experience of the Informal Meeting (this was my thirteenth), a progressive movement which justifies its inception and commends its management. The discussions at the meetings seldom reach the stage of the intense. They are mostly general and personal, though on this occasion the latter element was largely absent, due to the initiative of the President, who never obtrudes either himself or his work upon his hearers. To those who know Mr. M'Gilchrist, it is unnecessary to say that he is eminently qualified to preside at any meeting, whether friendly or hostile. This was a friendly meeting—the prevailing spirit being a sort of desire to recognize valuable services; and his good qualities shone with all the greater lustre. His address carried conviction with it. It is needless to go into it in detail; the meeting did that fully, and anything which might be said here would be but repetition, and the occupying of space unnecessarily. I will only refer to one point. He was all against the scheme of affiliation with the Institution of Gas Engineers. In this he rather went out of his way, because there is no proposal to affiliate the Informal Meeting, which, indeed, it would be impossible to do. But having introduced the subject, it must be said that he gave good reasons for his attitude upon it. At least, he gave the promoters of affiliation several nuts which they will find it hard work to crack. But I hope it may not be presumption to say that his dictionary reference might have been made to more pointedly show the crudeness of the proposal to "affiliate." The principal meaning of affiliation, in my dictionary, is "the assignment of an illegitimate child to its father." Now, the North British Association of Gas Managers, which, presumably, was the body he had in his mind's eye, can by no stretch of the imagination be regarded as the illegitimate offspring of any body; neither can the Institution of Gas Engineers—a creation of yesterday—be in any sense termed the parent of the North British Association. This may be merely a play on words. But the right use of words is of the essence of all agreements; and it is manifest that on this occasion the wrong word has been adopted. It is "confederation" which is really meant, and not "affiliation." When a movement starts with an erroneous description of itself, it is but natural that other defects in it should be looked for. It may be that the correct naming of the movement would not remove all the objections to it on its merits; but, on the other hand, it is evident that the President here took his first step in opposition on the ground that, while it is proposed to make one family, along with that there is the condition that some who have hitherto been brethren would have to be

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WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	TONBRIDGE	300,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT. . .	250,000	STRETFORD	500,000
COLCHESTER	300,000	WILKESBARRE, PA. . . .	750,000	OLDBURY	300,000
BIRKENHEAD	2,250,000	ST. CATHERINES (Second Contract)	250,000	TODMORDEN	500,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN. . . .	500,000	YORK (Second Contract) . .	750,000
WINDSOR ST., BIRMINGHAM (Second Contract) . . .	2,000,000	COLCHESTER (Second Contract)	300,000	ROCHESTER (Second Contract) .	500,000
HALIFAX	1,000,000	YORK	750,000	NEWPORT (MON.)	250,000
TORONTO	250,000	ROCHESTER	500,000	TOKIO, JAPAN	1,000,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	PERNAMBUCO (Brazil) . .	125,000
LINDSAY (Remodelled) . .	125,000	CRYSTAL PALACE DISTRICT .	2,000,000	MALTON	150,000
MONTREAL	500,000	DULUTH, MINN.	300,000	DULUTH, MINN. (Second Contract)	300,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	BROCKVILLE (ONT.) . . .	250,000
BELLEVILLE	250,000	LEICESTER	2,000,000	SMETHWICK	500,000
OTTAWA (Second Contract). .	250,000	ENSCHEDE (HOLLAND) . .	150,000	GRAVESEND	300,000
BRANTFORD (Remodelled) . .	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	NEWPORT MON. (Second Contract)	250,000
		BURNLEY	1,500,000	TORONTO (Third Contract) . .	750,000
		KINGSTON-ON-THAMES . .	1,750,000	TORONTO (Fourth Contract) .	1,000,000

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LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.
MONTREAL, ONT. (Second Contract), 1,800,000 C. Ft. HAMILTON, ONT., 400,000 C. Ft.

relegated to the position of cousins, or some more distant relationship. All of which shows that somewhere near the source of the movement there is a flaw, and that this flaw is not altogether a sentiment. To mark the attainment of the majority of the Meeting, the President arranged for an "At Home" in the evening. This function was highly popular. It was largely attended, and was most enjoyable.

At the Glasgow Town Council on Monday, Mr. Battersby asked if, in view of the fact that £20,000 was to be spent upon the substitution of lanterns for globular lamps, the opinion of any expert had been taken. Mr. Cleland said the matter was dealt with at the previous meeting of the Council, when a most elaborate report was submitted, giving the opinion of numerous experts. The Council unanimously approved of the report; and he was at a loss to understand the meaning of the question. Mr. Battersby interjected the remark that not one expert had been consulted.

The Cleaning and Lighting Committee of the Edinburgh Town Council on Monday considered the subject of the substitution of incandescent for flat-flame burners in the public lamps; and they resolved to recommend, not that the work should be overtaken in five years, but that during the ensuing year 20 per cent, or 1939 lamps, should be converted, at a cost of £4324. This restriction was made with a view to not tying the hands of the councillors who may be in office in the following years. A lively discussion was raised by Mr. Macpherson insisting upon laying before the Council extracts from a report which is being prepared on independent tests of the gas supplied to the city, both as to illuminating power and pressure. An endeavour was made to stop his divulging any part of the report until it is completed; but the Lord Provost allowed Mr. Macpherson to proceed. The attitude of this gentleman was that nothing should be done in the matter until the report as to the tests should be received. It was with reluctance that he furnished the information that the tests are being made by Dr. Marshall, of the University. The public, he said, believed they were getting 25-candle gas. The records of the tests taken on the 19th of December last were these: 3 30 a.m., 19¾ candles; 12.10 noon, 19½ candles; 2.40 p.m., 20¾ candles; 3 p.m, 23 candles; 3 30 p.m., 25¼ candles; and 8.10 p.m., 19¾ candles. It was, he said, a curious coincidence that the high power was at the hour when the public tests were taken on that day. On the 21st of December, Mr. John Ross, the Inspector of Gas-Meters, tested six ordinary street lamps for pressure. The minimum which the Gas Commissioners were bound to maintain was 5-10ths; there was no word of how high it might go. The pressures Mr. Ross found were 24-10ths, 26-10ths, 20-10ths, 27-10ths, 22-10ths, and 23-10ths respectively. The averages were a consumption of 1·77 cubic feet of gas per hour, and a pressure of 24·6-10ths. Bray burners tested at 5-10ths, 10-10ths, 15-10ths, 20-10ths, 25-10ths, and 30-10ths pressure gave the following as the consumption of gas, in cubic feet, per hour: No. 1, 1 50, 2·20, 2·75, 3·25, 3·80, and 4·30 respectively. No. 2, 1·50, 2·40, 3, 3·60, 4·15, and 4 70. No. 3, 1·80, 2·65, 3·25, 4·00, 4·55, and 5·15. No. 4, 2 10, 3, 3·70, 4·55, 5·20, and 5 70. Mr. Macpherson commented with considerable severity upon the figures he had given. He was seconded by Treasurer Brown, who was proceeding in the same strain; but the Council was counted out. They are to be called together again next week, to dispose of this and some other business.

A conference took place on Thursday between representatives of the Town Council of Dundee and the Harbour Board, upon the subject of the refusal of the Dundee and Arbroath Joint Railway Company to convey coal and coke between the gas-works and the harbour, in consequence of which coke is accumulating in the gas-works because it cannot be got away. A letter from a firm of shipowners was submitted, in which it was stated that they had contracted to convey 3500 tons of coal by steamer from Leith to Dundee, but that the Railway Company refused to take the coal over the harbour lines. It was resolved that the Town Council and the Harbour Trust should co-operate with the object of approaching the proper authority with a view to compelling the Railway Company to convey traffic over the harbour lines, and that they should support a Parliamentary Bill which has for its object the forcing of Railway Companies to work private sidings.

A Dundee newspaper on Wednesday remarked that the Millennium will have arrived when questions affecting the gas-works will have ceased to be a bone of contention at the monthly meetings of the Broughty Ferry Town Council. On the previous day, several subjects relating to the gas-works were discussed. Mr. Sim began by stating that there had been an explosion in the works; and he wanted to know the nature and extent of the damage, and why it was not reported to the Gas Committee. Mr. Crystal, the Convener of the Gas Committee, said he did not know of any such accident till the day after the meeting of the Gas Committee, when he heard some gossip, which had also apparently reached Mr. Sim's ears. He inquired of the Manager (Mr. Keillor), who told him it was a small matter, and that he did not think it worth reporting to the Committee. Mr. Keillor explained to the Council that two months ago he reported to them that there were certain defects in connection with the retort-bench which might prove dangerous. Unfortunately, this had happened. The explosion was occasioned by one of these defects; but it was not of such a serious nature as Mr. Sim had endeavoured to make out. Through some means or other, gas had got into a setting of retorts which had been out of use; and it had ignited—they did not know how. He had not yet ascertained the extent of the damage; but it was very slight, and the repairs would not be expensive. Then a series of rules which have been posted at the gas-works roused the ire of Mr. Westwood, of whom we have some recollections as one of the most persistent of gas-works critics. He did not approve of certain of the rules, nor of their having been introduced without the sanction of the Council. One of the rules was to the effect that if one of the workmen gave information to anyone regarding the works, he would be instantly dismissed. This was a very drastic rule; and he questioned its legality. Mr. Crystal said he was quite aware that the rules had been posted at the works. Another one of the rules was: "Strangers are not permitted to enter the works without the permission of the Manager." Mr. Westwood

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seemed to regard himself as a stranger. At the same time he did not think the councillor would be losing any of his dignity if, before going into the works, he called upon the Manager. In the interests of discipline, they must very strongly object to any members of the Council going to the works and putting questions to the men. Mr. Scott thought that if they had had such rules in force before, gas affairs would not have got into such a mess. Mr. Westwood moved that the rules be removed until sanctioned by the Council. Provost Gray thought the Manager's hands should be strengthened as far as possible; and he moved a direct negative. Only Mr. Westwood and Mr. Sim voted for the motion, which was accordingly defeated. Mr. Westwood then raised an objection to the method of dealing with the accounts of the Gas Department. The accounts were placed before a Sub-Committee of the Gas Committee, and they examined them, and recommended them to the Finance Committee for payment. The Gas Sub-Committee, he submitted, had no right to make any such recommendation. The passing of the accounts was the function of the Finance Committee; and as Convener of that Committee he protested against the procedure. His motion to disapprove of the minute of the Gas Sub-Committee was, however, not seconded. The Council let to Messrs. R. Dempster and Sons, Limited, of Elland, the contracts for the provision of a conveyer and coal-hoppers, at the price of £1100; of a foul main and bench mountings, at the price of £599; and of a coke-haulage railway, at the price of £169.

At the meeting of the Corporation of Arbroath on Monday, the Manager—Mr. A. C. Young—was authorized to visit gas-works during the summer, and to report, not later than January next, as to the working of machinery for coal and coke handling and stoking.

Outside Lamps in the City.—The Streets Committee of the Public Health Department at the Guildhall have just issued a series of regulations relating to lamps, clocks, cranes, and projecting boards within the City. In future every application for a lamp, clock, or crane must be accompanied by drawings showing the dimensions, mode of fixing, and total projection from the frontage line. Lamps not used for shop-window lighting must not be less than 12 feet from the footway; while their external dimensions, including frame and ornaments, must not exceed 5 feet in height and 3 feet in any other direction. They must not project more than 4 ft. 6 in. from the front of the house, or be less than 2 feet from the carriage way. Advertisements may be placed on the sides, but not on the bottoms of such lamps, which must be kept lighted from sunset until the premises upon which they are fixed are closed. With regard to lamps used for shop-window lighting, the underside portion must not be less than 8 feet from the pavement; the extreme projection over the public way not exceeding 3 feet when the width of the pavement permits, and not less than 2 feet from the carriage way. The external dimensions of such lamps must not be more than 2 ft. 3 in. in any direction.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April* 16.

Sulphate of Ammonia.

Anticipations of a sustained spring demand during the current month have so far been disappointed, and a dragging market has been experienced during the week. Spanish and Colonial orders, which had been the mainstay of the market, have been absent, and requirements for home consumption have not improved; therefore prices have eased off all round. For Leith and Glasgow delivery, some business is reported at £12 10s. per ton. The large London makers have reduced their quotation 2s. 6d. per ton; but no business is reported. To-day's quotations are £12 8s. 9d. per ton f.o.b. Hull, and £12 10s. f.o.b. Liverpool and Leith. Forward delivery has been neglected.

Nitrate of Soda.

This article continues firm on spot at 10s. 1½d. per cwt. for ordinary, and 10s. 4½d. for refined quality; but as arrivals are now daily expected, it is hardly likely these prices will be maintained.

LONDON, *April* 15.

Tar Products.

Markets generally have been quiet during the past week, and prices, as a rule, have had a slightly downward tendency. In pitch, so far as the makers are concerned, the position is practically unchanged; but on the Continent very low prices have been accepted, both for prompt and forward delivery. One or two sales were made in the North of France and Belgium, for early shipment, at prices much under those recently ruling; while still lower quotations are talked of for forward delivery. There has been rather more inquiry from South Wales; but fuel makers do not seem inclined to pay the prices asked by distillers. They are evidently fairly well supplied for prompt delivery, and seem to believe in a still further fall in value next winter. The large London makers are certainly firmer in their ideas than the country tar distillers, who have in more than one instance lately shown a desire to sell for forward delivery at slightly lower prices than those now ruling. There has been no actual business doing during the week in 90 per cent. benzol; but there have been one or two inquiries from the Continent. Buyers' ideas, however, are very much under those quoted by dealers here. Solvent continues very dull. It is reported that business has been done in the North at very low prices indeed—one or two makers being heavily stocked, and therefore compelled to clear out a certain quantity for early delivery. There is no business of importance to report in creosote, although there are one or two large inquiries in the North of England. Consumers appear to be fairly well supplied, and are not at all inclined to buy at any advance on existing quotations. As regards London, the difficulty in obtaining barrels still prevents business being done for export to any extent. Anthracene remains in the same position. It was reported that an offer was made for a large quantity for

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delivery over the last six months of the present year by Continental consumers. Manufacturers, however, would not entertain business at anything like the price mentioned. Carbolic acid is certainly better; and there is more inquiry for crude. Consumers are now prepared to pay 1s. 11d. f.o.b.; but makers hold firm at 2s, which, in all probability, they will obtain should the demand continue. There is not so much offering in crystals for prompt delivery. The small parcels which were being offered by dealers at low prices appear to have been cleared off; and there is certainly an improved inquiry for early delivery. At the same time, it is reported that German manufacturers are still open to sell for July-December, at prices under those at present ruling.

The average values during the week were: Tar, 18s. to 23s. Pitch, London, 33s. 6d. to 34s.; east coast, 32s. 6d. to 32s. 9d.; west coast, 31s. 6d. to 32s. Benzol, 90 per cent., 9¼d. to 10d.; 50-90 per cent., 7d. Toluol, 6½d. to 7d. Crude naphtha, 3d. to 3¼d.; solvent naphtha, 7d. to 8d.; heavy naphtha, 10d. to 10½d. Creosote, London, 1 9/16d. to 1 11/16d.; North, 1¼d. Heavy oils, 2¼d. to 2⅜d. Carbolic acid, 60 per cent., 1s. 10½d. to 1s. 11d. Refined naphthalene, £5 to £8; salts, 22s. to 24s. Anthracene, "A" quality, 1¾d. to 2d.; "B" quality, 1d. nominal.

Sulphate of Ammonia.

Markets continue very dull; and there does not seem to be any business doing. Beckton still quote £12 12s. 6d. in any position, but do not appear to be at all anxious for business. The South Metropolitan Company would accept £12 11s. 3d. for early delivery; but just at present there is no business doing even at this figure. In Hull, one or two small sales are reported at £12 8s. 9d. for early shipment; but consumers do not seem to take any interest in the article for forward delivery. Business at Liverpool has been done at £12 8s. 9d. for prompt, but only to a very limited extent; and there does not appear to be much inquiry for forward. In Leith, makers still quote £12 10s.; and business is reported to have been done at this price, although not to any great extent. There does not seem to be any inquiry for forward; but as makers are not anxious to sell May-June, it is difficult to fix the actual value for these months.

Dorking Gas Company.—At the 66th half-yearly meeting of this Company on the 29th ult., the Directors reported an increase to the extent of 5 per cent. in the quantity of gas sold to private consumers, due to new business. The accounts for the six months to the 31st of December last showed, after providing for the interest on the debenture stock, a balance available for distribution of £2365 11s. 7d. The Directors recommended the payment of maximum dividends on all classes of shares, which would absorb the sum of £1567 3s. 9d.; and out of the remaining balance they proposed to transfer £500 to a reserve fund, and carry forward £298 7s. 10d. to the next accounts. The report was adopted.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Beyond the reduction of 10d. per ton at the Manchester collieries on house-fire coals with the commencement of the month, and a modification of prices by collieries in other districts where they have to meet the competition of the lower Manchester rates, there has been no further giving way. Outside the Manchester radius, Lancashire collieries are still holding with firmness to late rates, so far as house-fire coals are concerned. The demand for the present continues fairly good; and the very considerable curtailment of output during the holidays has enabled them to clear off a fair amount of stock. Best Wigan Arley coals remain about 13s. to 14s. per ton at the pit, seconds Arley and Pemberton four feet 11s. to 12s., and common house coals from 9s. and 9s. 6d. up to 10s. 6d. Business still moves on but very moderately in the lower qualities of round coal used for steam and forge purposes; and prices for these, although without any actually quoted change, are weak. The pit prices on inland sales for steam and forge purposes range from 7s. 9d. and 8s. per ton for very common descriptions, up to 8s. 6d. and 8s. 9d. for the better qualities. For shipment, low figures are still taken—9s. to 9s. 3d. being the average quotations for delivery at the ports on the Mersey or the Manchester Ship Canal. A few contracts for gas coal are gradually being settled; and it is reported that in several instances a reduction of 6d. per ton has been accepted on last year's rates—contracts, it is stated, having been placed at a trifle under 8s. at the pit. The question of gas-coal contract prices for the ensuing season has naturally been informally discussed among the colliery owners, and there would seem to be some sort of an understanding that where substantial concessions were made on last year's contracts, there should be no further material giving way this year, and that only where no considerable reduction was made last year are quotations to be further reduced for the ensuing season's contracts. The object in view appears to be that, as far as possible, contracts should not be accepted this year at a greater reduction than 6d. per ton upon the 1902 prices. How far this will be carried out, of course, remains to be seen; but taking the market position generally, it is by no means a strong one, and already some collieries are giving way a further 6d. per ton. Reports with regard to engine classes of fuel continue to show considerable variation—slack hanging at some collieries, while at others the production is not more than keeping up with the requirements of customers. There are, however, plentiful supplies on the market, especially of the inferior sorts; and a good deal of slack is still being sent in from outside districts at very low figures. The commonest Lancashire slack could be bought at from 3s. 9d. and 4s. to 4s. 6d. per ton at the pit, with medium qualities averaging 5s. to 5s. 6d., and best descriptions about 6s. to 6s. 6d.

Northern Coal Trade.

There is more activity in the coal trade; and the commencement of shipments to Baltic ports must give a continuance of this briskness

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for some time to come. In the steam coal trade, the best Northumbrians are steady at from 10s. 9d. to 11s. per ton f.o.b., second-class steams are 9s., and steam smalls from 4s. 9d. to 5s. 9d. The collieries are now better employed; and the output of the best steams is sold for a little time ahead. In the gas coal trade, the demand is fair on contract, though less than it was. Most of the large contracts for the Metropolitan gas coal supply have now been arranged. The last, and the largest, series are for coal delivered in the Thames; but making the current allowance for the sea freight, the prices will rule from something like 7s. 8d. up to about 8s. 2d. per ton f.o.b., while the use of large or small steamers may slightly affect these figures. Coal for occasional sales is slightly above the rates just given. Good quality gas coke is from 13s. to 13s. 3d. per ton f.o.b. on the Tyne.

Scotch Coal Trade.

Business continues to show better, particularly the home trade. There is also an improving inquiry by foreign purchasers. Prices have slightly advanced. The quotations are: Main 7s. 6d. to 7s. 9d. per ton f.o.b. Glasgow, ell 8s. 6d. to 9s. 9d., and splint 8s. 9d. to 9s. The shipments for the week amounted to 187,138 tons—a decrease of 51,490 tons upon the preceding week (due to stormy weather), and of 32,186 tons upon the corresponding week of last year. For the year to date, the total shipments have been 2,529,898 tons—a decrease of 137,844 tons upon the same period of 1903.

Yorktown and Blackwater Gas Company, Limited.—At the recent annual meeting of the Company, the Directors reported that, after paying all charges and the interest on debenture bonds and preference capital, there remained a balance of £1914 5s. 9d. Out of this they recommended the payment of dividends at the rate of 10 per cent. on the original and 7 per cent. on the additional shares; carrying forward a balance of £1320 9s. 10d. In moving the adoption of the report, the Chairman (Mr. A. H. Claypole, J.P.) stated that the make of gas during the past year showed an increase of 4,543,000 cubic feet, or 21·5 per cent.; and to this must be added the quantity supplied to the Royal Military and Staff Colleges, the contract for which they obtained in August. The amount received from the sale of residuals was £1480 12s.; being an increase of £851 17s. 3d. on that of the previous year. In August, they commenced the manufacture of sulphate of ammonia from the ammoniacal liquor, which had now become a valuable source of revenue. He concluded by referring to the Company's Bill before Parliament, and to the fact that all opposition to it had been withdrawn. Mr. Webb, in seconding the motion, congratulated the shareholders on the success of the Company during last year, for which, he said, they had to thank their Engineer and Manager (Mr. J. Meiklejohn). After the re-election of the Directors and Auditor, Mr. Meiklejohn made a few remarks on the affairs of the Company, and emphasized the value of prepayment meter consumers, whom he characterized as the "backbone" of gas companies.

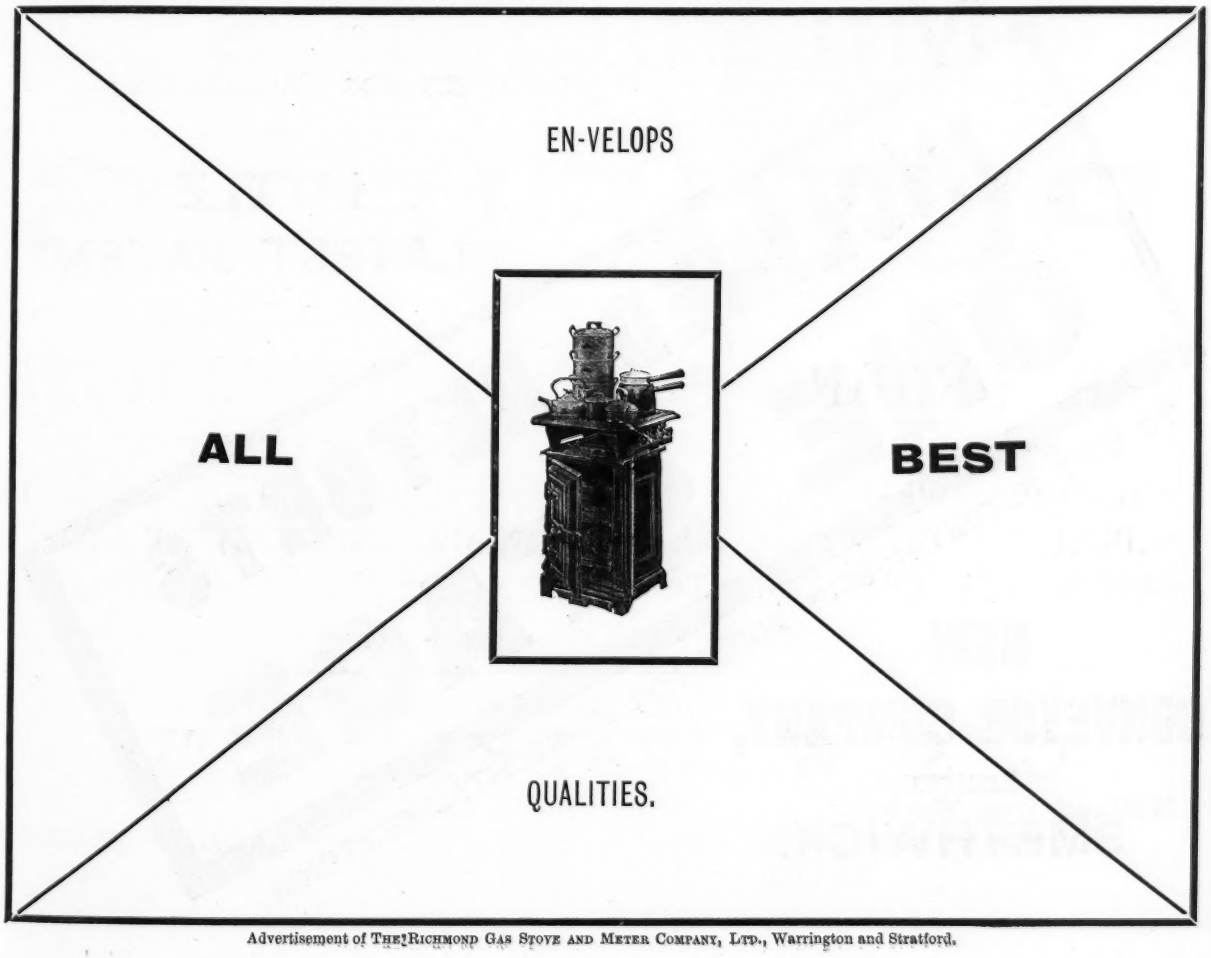
Paris Gas Company.—According to the report presented at the recent annual meeting of the Company, the revenue for the year ending the 31st of December last amounted to £4,923,194, compared with £4,504,231 for the preceding twelve months; showing an increase of £418,963. The expenditure was £3,296,237, against £3,180,104, or £116,133 more. There was a profit balance, therefore, of £302,830 on last year's working.

Gas as a Safeguard from Panic.—On the 29th of January last, the electric light failed at the Lambeth Public Hall, when the building was crowded, and a panic was narrowly averted. At a meeting of the Borough Council on Thursday, a long report was presented by the Baths Committee, in which they stated that, as gas had already been laid on to the premises, they had authorized connections to the boiler-house and engine-room, to meet such emergencies as that mentioned, as well as the fixing of gas-burners over the exits from the hall.

Popularizing Prepayment Installations at Belfast.—In connection with the recent introduction of prepayment meters into Belfast, it has been decided by the Gas and Electric Committee that, for the purpose of showing working men the advantages of having one of these meters and a boiling-ring or griller fixed in their houses, arrangements shall be made to exhibit and explain the apparatus at a number of the large mills and workshops in the city. The Engineer (Mr. James Stelfox) is to obtain from the proprietors of these establishments the necessary permission for this to be done.

Reductions in Price.—The Stalybridge Town Council have resolved to reduce the price of gas from 2s. 7d. to 2s. 6d. per 1000 cubic feet, as from the 25th ult.; the usual discount of 3d. being allowed. A sum of £1692 out of the profits is to be carried to the credit of the borough rate, and £1332 added to the insurance fund. One of the members stated that there were many complaints about the quality of the gas, and he hoped the reduction in cost would not mean a deterioration in this respect. The Directors of the Pudsey Gas Company announce a reduction in the price of gas, as from July 1 next, from 2s. 6d. fo 2s. 5d. per 1000 cubic feet.

Newcastle and Gateshead Water Bill.—The Parliamentary and Gas and Water Committees have presented a report to the City Council relative to the Newcastle and Gateshead Water Company's Bill. The Council had resolved that a petition should be signed against the measure, which proposes to extend the area of supply, and also deals with the sale of water in bulk. The Committees had interviews with the Company; and it was found that the extension of the limits would not endanger the supply to Newcastle, and that the water in bulk would be furnished only within the additional area of supply. The Committees therefore recommended that, the clauses being amended, the opposition to the Bill should be withdrawn. Sir C. F. Hamond said the Company had treated them most handsomely; and the terms were very fair. The report was adopted.



Advertisement of THE RICHMOND GAS STOVE AND METER COMPANY, LTD., Warrington and Stratford.

Leakage from a Birmingham Reservoir.—The storage reservoir in connection with the Birmingham Water Supply which has been constructed at Frankley, on being tested recently, showed signs of leakage; but fortunately the defect is not so serious as was at first feared. The reservoir, which is semi-circular in shape, and has a total capacity of 200 million gallons, has not yet been taken over by the Corporation; and it is hoped that the contractors will soon rectify the fault. The leakage is supposed to be in the asphalte at the bed of one of the basins; and it was discovered directly the basin was tested.

Discoloured Water for Public Baths.—For four weeks prior to Nov. 7 last year, a large quantity of water supplied by the Southwark and Vauxhall Water Company to the Lavington Street Baths, belonging to the Southwark Borough Council, had to be run to waste owing to its inferior quality; and a claim was made upon the Company for £16 9s. 6d., the extra expense the Council had been put to in consequence. The Company offered, without prejudice, an allowance of £5 off their account. This the Baths Committee would not accept. On the 8th of January, the Company again wrote stating that they could not see their way to make any further allowance, and urged that at the period in question the water was only slightly coloured with a vegetable stain, which filtration was powerless to remove. This explanation the Baths Committee considered unsatisfactory and contrary to the facts; and they gave instructions to the Borough Treasurer to deduct from the Company's Christmas account the sum of £10 for the extra cost only of the water run to waste. A cheque for £68 was passed by the Council in lieu of £78, the amount of the account rendered; but the Company have declined to receive it, and through their Solicitors claim payment of the account in full.

New Water Reservoir at Cape Town.—The last stone of the reservoir wall of the Hely-Hutchinson reservoir has lately been laid by His Excellency the Governor of Cape Colony. Mr. T. Stewart, M.Inst.C E., has been the Engineer concerned. The reservoir is 2453 feet above the sea level, and is situated on what is known as the lower plateau of Table Mountain. The catchment area above the dam extends to about 500 acres, and is capable of yielding over 500 million gallons of water in the driest years. The reservoir is designed to hold about 200 million gallons. It was filled to the extent of half this quantity at the close of the last wet season; at present, the water in store is about 68 million gallons. The area covered by water when the reservoir is full is 40 acres. The dam stretches across the valley immediately above the Woodhead reservoir. It is built of masonry and concrete, and is 1745 feet long and 57 feet high at the deepest point of the reservoir. The depth of the water which can be drawn off is 50 feet. The dam at the ground level is 37 feet wide, and at the top 6 ft. 6 in. It is founded entirely on rock. Generally this was met at a depth below the surface of between 8 and 12 feet. But at one place the excavations had to be carried to a depth of 69 feet; making the height of the wall at this point 107 feet. The quantity of masonry and concrete in the dam is about 47,000 cubic yards.

Kimberley Water-Works Company, Limited.—The report for the past year shows a balance of £32,179. After providing £5012 for debenture interest and £789 for the usual items of depreciation abroad, the net profit, including £1540 of interest on investments, is £27,919. Out of this sum the Directors propose to write off £9000 from construction, to transfer £2000 to the contingency fund (raising it to £32,000), and £1169 to the investment fluctuation reserve, and to pay a dividend of 5 per cent., absorbing £15,750.

Suggested Additional Reservoir in the Thames Valley.—A correspondent has sent to the "Builder" a rough sketch of a suggestion for a reservoir, to hold from 400 to 500 million gallons of water, to be constructed on a site formed by a bend of the river between Teddington and Twickenham; the reservoir being close to the stream, and to the west of Petersham. The scheme includes new roads and bridges, opening up a district which it is thought might be used for building. A great quantity of material would have to be removed; but the writer thinks this could be disposed of profitably, and the work, extended over several years, might help the solution of the "unemployed" question in the locality of London.

Charges for Water at Yeovil.—Some further discussion with reference to the charge for water for manufacturing purposes took place at the meeting of the Yeovil Town Council yesterday week. It was recently decided that manufacturers should pay 7d. per 1000 gallons; this being a fraction over the cost price. Alderman Pittard, the Chairman of the Water Committee, and one of the largest consumers, now contended that in no other place was such a charge imposed; and he moved that the price be lowered. The Council rejected this proposal, but agreed that when the new works, now in course of construction, are completed, a Committee shall be appointed to decide the exact cost per 1000 gallons, and, if necessary, revise the scale.

Honiton Water Supply.—The Mayor of Honiton (Mr. J. C. Macaulay) formally inaugurated last Tuesday the new works constructed by the Corporation for augmenting the water supply of the borough. After entertaining them to luncheon, Mr. Nicholls, of the firm of Messrs. Beesley, Son, and Nicholls, the Engineers of the scheme, conducted a party, comprising members of the Corporation and others, round the works. The Mayor then turned on the water to the service reservoir, and in a brief speech complimented the Engineers and Mr. Donald Cameron, the representative of the Contractor, on the successful completion of the work. The undertaking, which was begun in October, 1902, comprises two storage reservoirs, a service reservoir, and automatic filter-beds. The total capacity of the reservoirs is 1½ million gallons; and the works are capable of yielding a daily supply of 48,000 gallons. A sum of £6200 has been spent in carrying them out. This is considerably in excess of the original estimate; an additional outlay having been incurred in complying with the Local Government Board's requirements, and through adverse weather. Difficulty was also experienced through the failure of a former Contractor; but Mr. Cameron has carried it to a successful conclusion.

PLEASE APPLY FOR PARTICULARS
OF
LITTLE'S
LATEST PATENT
TO
INCLINED RETORTS
WITH
ONE STAGE
TO SUIT RETORT-HOUSES BUILT FOR HORIZONTAL SETTINGS.
NEW
CONVEYOR COMPANY,
LIMITED
SMETHWICK.

Discovery of Water near Skipton.—A rather valuable discovery of water has been made at Threshfield, near Skipton. Mr. John Delaney, the proprietor of the Horton Lime-Works, who has leased Threshfield Moor from Sir Matthew Wilson, with the object of sinking for coal, has been deepening the sump hole at his pit to get sufficient room to hold the water necessary for coal-washing purposes. It was intended to go 24 feet below the bottom balks on which the cages rest; but, owing to the ever-increasing volume of water met with, 18 feet was the extent of the depth. It was found that at 8 feet below the cages the flow of water was 1100 gallons per hour; but every foot that was sunk farther produced a more abundant supply, and up to the 2nd inst. the yield had been for a fortnight 10,000 gallons per hour. It is assumed that by going lower there would be sufficient water of the very best quality to supply Skipton, as well as Mr. Delaney's works at Threshfield. On the day named, the yield was 240,000 gallons, with a small pump; but Mr. Delaney has on hand a pump that would lift more than 2 million gallons per day of 24 hours from a depth of 150 fathoms.

Incandescent Gas for the Public Lighting of Teddington.—At the Meeting of the Teddington Urban District Council on Monday last week, the Lighting Committee presented a long report on the tenders received from the Twickenham and Teddington Electric Supply Company and the Hampton Court Gas Company for lighting the public streets. Some time ago, the Electric Supply Company asked to be allowed to experimentally show their system; and Church Street was placed at their disposal. There they put up 12 Nernst lamps, with a reputed illuminating power 120 candles. The Gas Company applied for leave to show what they could do; and they were assigned portions of three roads, where their Engineer (Mr. W. E. Price) installed three patterns of incandescent lamps with candle powers varying from 80 to 120. This installation was referred to in the "JOURNAL" for the 15th ult., p. 714. The test between the rival systems went on for a month. In the course of their report, the Committee said: "The price for the electric light fixed on the existing lamp-posts with brackets and lanterns for ½-ampere "Luna" Nernst lamps of 120-candle power, with all necessary cables and electrical apparatus, to include current, lighting, cleaning, repairs to lamps and lanterns, but not painting, would be £3 6s. 6d. per annum. The quotations for gas were as follows: The hours per annum of lighting to be 3636 as at present. For 'C' Welsbach incandescent burners, as at present installed in the district, and giving a light of about 80-candle power, £2 17s. 6d. per burner per annum; No. 4 Kern incandescent burner, giving a light of about 100 candles, £3 7s. 6d. per burner per annum; a higher-power light of 120 candles, £3 15s. 6d. per annum. If either of the latter types of burners were adopted, new and larger patterns of lanterns would have to be employed. The Committee have inspected the lights, and recommend that the tender of the Hampton Court Gas Company be accepted for the 'C' Welsbach pattern as at present, the contract to be terminable by either party at any time on giving twelve months' notice." Mr. Bryan, the Chairman of the Committee, said they had come to the conclusion that the electric light was in a state of development, and they had failed to find in the results of the test a sufficient advantage in electricity over the existing system of gas lighting to warrant the Council in going to the extra expense that would be entailed. The recommendation was unanimously adopted.

Last Thursday, in the Cory Memorial Hall, Cardiff, Professor Vivian B. Lewes delivered, under the auspices of the Cardiff Naturalist Society, a public lecture, illustrated by experiments, on the "Incandescent Mantle."

Considerable damage was caused one day last week by the bursting of a water-main in Belfast; the flagging of the footpath being torn up, and the ground floor of a hardware shop flooded. Traffic in the thoroughfare was at a standstill until the water was cut off.

On Wednesday, the 30th ult., the representatives of the Richmond Gas Stove and Meter Company, Limited, held their half-yearly conference at the Warrington works of the Company, to discuss plans and methods of working during the coming summer season. Mr. H. M. Thornton presided.

Last Tuesday, Mr. Justice Joyce appointed Mr. Noel W. Burbidge, F.C.A., Receiver and Manager of Messrs. Bryan Donkin and Clench, Limited, of Chesterfield. In this connection, we are asked to state that the business will be carried on as usual, and that Mr. Burbidge hopes to retain, in connection with the management, the services of Messrs. E. B. & H. J. Donkin.

At the Bristol County Court on Friday, his Honour Judge Austin gave judgment in a case which had occupied his attention at a previous hearing. The action was brought by Mr. Alexander M. Ross, a nurseryman, of Staple Hill, Bristol, against the Bristol Gas Company, to recover compensation for injury through their alleged negligence. The particulars of plaintiff's claim set forth that he had suffered damage from destruction of plants in his greenhouses and premises by escapes of gas from the Company's main in November and December, 1903, and in January and February of the present year. The negligence asserted was in laying a main along the Mangotsfield Road at Staple Hill; and plaintiff claimed £50, and asked for an injunction to restrain the defendants from continuing or repeating the injury. Mr. Douglas Metcalfe, who appeared for the plaintiff, explained that the mains were extended along the road in question last October; and the work was finished in November. Towards the middle of the month plaintiff detected an unusual odour in his greenhouses, and noticed that the plants were languishing. The smell became worse as time went on, and it was attributed to an escape of gas. Though temporary repairs were effected by the Company on complaint being made to them, things went from bad to worse. For the defence, Mr. Weatherby, who represented the Company, called Alfred Jones, the Superintendent of Mains, who stated that the pipes, though not new, were sound, and that the main was properly laid. His theory was that there was an escape of gas on other premises, and that the gas entered a sewer and eventually made its way into the plaintiff's greenhouses. He estimated that the distance from the point of the alleged escape to plaintiff's premises was 230 yards. In the result, judgment was given for plaintiff for £35 and costs.

PARKINSON'S SLOT COOKERS.

NEW DESIGNS.

Particulars on Application.

PARKINSON AND W. & B. COWAN, LTD.
(*Parkinson Branch*),
COTTAGE LANE, CITY ROAD, LONDON.
BELL BARN ROAD, BIRMINGHAM.

The Directors of the River Plate Gas Company, Limited, recommend a final dividend for 1903 of 8s. per share (tax free); making 7 per cent for the year.

The Abercarn Urban District Council have placed a contract with the Richmond Gas Stove and Meter Company, Limited, for the supply and fixing of automatic installations, comprising meter, stove, two brackets, pendant, and all necessary piping. They anticipate that 500 of these installations will be required; the demand being already considerable.

At the Wiltshire Assizes, recently held at Salisbury, a travelling hawker named Frederick Williams pleaded guilty to several charges of obtaining money by false pretences at Swindon. The evidence showed that for five years prisoner had carried on an absolutely fraudulent business by selling what he represented to be magnesium carbide for preserving and increasing the brilliancy of incandescent gas mantles, but which was really nothing more than common whiting and water. There were nearly 100 complaints against prisoner, who pleaded for a chance to enable him to retrieve his character. He was sent to gaol for four months, with hard labour.

Mr. Arthur Gibson has been appointed the representative for the South of England of Drakes Limited, of Bridge House, 181, Queen Victoria Street, E.C.

At the meeting of the Newport (Mon.) Town Council last Tuesday, it was announced that the Wentwood water scheme, which has been in progress for many years, and upon which £400,000 has been spent, will be opened very shortly. The storage of water has already commenced; and there are now 65 million gallons in the reservoir.

An interesting paper on "Gas Measurement" was read last Saturday week by Mr. A. Cooke before the Birmingham Association of Mechanical Engineers, in the course of which the author sketched the history of gas lighting and the gas-meter. Mr. Cooke pointed out that the first indicator to show the quantity of gas which had passed through the meter was the invention of Sir William Congreve; and he said that though the meter was largely blamed for heavy gas bills, the fault generally lay with the ignorance of the consumer and inattention to details, such as the burners and the cleaning out of the pipes. On the motion of the President (Mr. R. Holliday), a hearty vote of thanks was accorded to Mr. Cooke for his communication.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 152.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 14	10½	Alliance & Dublin 10 p.c.	19—20*	..	5 5 0
100,000	10	,,	7½	Do. 7 p.c.	13—14*	..	5 7 2
200,000	5	Nov. 12	6½	Bombay, Ltd.	6—6½	+⅛	5 4 0
140,000	5	,,	6½	Do. New, £4 paid	4⅛—4⅜	+⅛	5 9 6
380,000	Stk.	Feb. 25	12	Brentford Consolidated	230—235	+8	5 2 2
300,000	,,	,,	9	Do. New	175—180	+8	5 0 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	127—132	..	3 15 9
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	103—108	..	3 14 1
220,000	Stk.	Mar. 10	10½	Brighton & Hove Orig.	203—208	+1	5 3 5
246,320	,,	,,	7½	Do. A. Ord. Stk.	143—148	+1	5 4 9
460,000	20	Apl. 14	10	British	38—39*	+½	5 2 7
100,000	Stk.	Feb. 25	6	Bromley, Ord. 5 p.c.	112—117	..	5 2 7
165,700	,,	,,	4½	Do. do. 3½ p.c.	85—90	..	5 0 0
500,000	10	Oct. 15	7	Buenos Ayres (New) Ltd	10⅜—11¼	+¼	6 4 5
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	91—93	..	4 6 0
150,000	20	Mar. 10	8½	Cagliari, Ltd.	21—23	..	7 3 6
100,000	10	June 11	10	Cape Town & Dis., Ltd.	14—15	..	0 13 4
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
1,375,000	Stk.	Feb. 25	5⅝	Commercial 4 p.c. Stk.	104—109	+2	4 15 5
536,485	,,	,,	5	Do. 3½ p.c. do.	102—105	+5	4 15 3
442,947	,,	Dec. 11	3	Do. 3 p.c. Deb. do.	84—87	..	3 9 0
800,000	Stk.	Dec. 30	7	Continental Union, Ltd.	110—115	+3	6 1 9
200,000	,,	,,	7	Do. 7 p.c. Pref.	135—140	+3	5 0 0
575,000	Stk.	Feb. 25	5⅛	Crystal Palace Ord. 5 p.c.	113—118	+3	4 10 2
60,000	,,	,,	5	Do. 5 p.c. Pref.	115—120	..	4 3 4
112,533	,,	Jan. 14	5	Do. 5 p.c. Deb. Stk.	134—137	..	3 13 10
486,090	10	Jan. 28	10½	European, Ltd.	18½—19½	+⅛	5 7 8
354,060	10	,,	10½	Do. £7 10s. paid	13⅛—14⅛	+⅛	5 8 8
15,243,200	Stk.	Feb. 11	4⅛	Gas-light and Coke	4 p.c. Ord.	92—94	+5	4 13 7
2,600,000	,,	,,	3½		3½ p.c. max.	88—90	..	3 17 9
3,799,735	,,	,,	4		4 p.c. Con. Pref.	104—107	..	3 14 9
4,193,975	,,	Dec. 11	3		3 p.c. Con. Deb.	87—89	+2	3 7 5
258,740	Stk.	Mar. 10	5	Hastings & St. L. 3½ p.c.		88—93	..	5 7 6
70,000	10	Oct. 15	11	Hongkong & China, Ltd.		16—17	..	6 9 5
3,800,000	Stk.	Nov. 12	10	Imperial Continental		202—206	+2½	4 17 1
473,600	Stk.	Feb. 11	3½	Do. 3½ p.c. Deb. Red.		97—99	..	3 10 8
165,242	Stk.	Mar. 10	6	Lea Bridge Ord. 5 p.c.		105—110	+2	5 9 1
561,000	Stk.	Feb. 25	10	Liverpool United A		209¼—210½	..	4 15 0
718,100	,,	,,	7	Do. do. B		158½—160½	..	4 7 3
306,083	,,	Dec. 30	4	Do. do. Deb. Stk.		108—110	..	3 12 9
75,000	5	Dec. 11	5	Malta & Medn., Ltd.		4⅛—4⅜	..	5 5 3
560,000	100	Apl. 5	5	Met. of Melbourne	5 p.c. Deb.	100—103	..	4 17 1
250,000	100	,,	4½		4½ p.c. Deb.	101—102	..	4 8 3
541,920	20	Nov. 12	3½	Monte Video, Ltd.		9⅜—10⅛	+⅛	6 13 4
1,515,892	Stk.	Feb. 26	4½	Newc'tle & G'tesh'd Con.		104½—105½	−½	4 5 4
405,025	Stk.	Dec. 31	3½	Do. 3½ p.c. Deb.		93⅜—94½	..	3 14 1
300,000	Stk.	Nov. 26	8	Oriental, Ltd.		135—140	..	5 14 4
600,000	5	Mar. 29		Ottoman, Ltd.		⅝—6	+⅛	5 16 8

* Ex div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
205,005	Stk.	Jan. 14	6½	Ply'mth & St'house 5 p.c	121—126	..	4 17 2
851,070	10	Oct. 15	7	River Plate Ord.	11¾—12¼	+¼	5 14 3
300,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	92—94	..	4 5 1
250,000	10	Mar. 29	7	San Paulo, Ltd.	10⅞—11⅛	..	6 1 9
135,000	Stk.	Mar. 10	10	Sheffield A	236—238	..	4 4 0
209,984	,,	,,	10	Do. B	235—237	..	4 4 5
523,498	,,	,,	10	Do. C	231—236	..	4 4 9
116,106	Stk.	Mar. 29	5	Shrewsbury Ord. 5 p.c.	107—110	..	4 10 11
6,150,000	Stk.	Feb. 1	5½	South Met., 4 p.c. Ord.	123—125	+6	4 4 7
1,832 700	,,	Jan. 14	3	Do. 3 p.c. Deb.	85—89	+1	3 7 5
300,940	Stk.	Nov. 12	5	Southampton Ord.	105—110	..	4 10 11
87,950	,,	Jan. 14	4	Do. 4 p.c. Deb.	100—103	..	3 17 8
120,000	Stk.	Feb. 25	6	Tottenham and Edmonton A. 5 p.c.	112—117	..	5 2 7
313,020	,,	,,	4½	Edmonton B. 3½ p.c.	93—58	..	4 11 10
182,380	10	Dec. 30	8	Tuscan, Ltd.	⅞—9	..	8 17 10
149,000	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	97—99	..	5 1 0
745,872	Stk.	Mar. 10	5	West Ham, 5 p.c. Ord.	95—100	+2	5 0 0
				WATER COMPANIES.			
781,517	Stk.	Dec. 30	12	Chelsea, Ord.	350—355	..	3 7 7
150,000	,,	,,	5	Do. 5 p.c. Pref.	142—147	..	3 8 0
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	132—137	..	3 5 8
175,785	,,	Mar. 29	4½	Do. 4½ p.c. Deb.	130—135	..	3 6 8
1,720,560	Stk.	Mar. 29	8	East London, Ord.	217—222	..	3 12 1
654,740	,,	Dec. 11	4½	Do. 4½ p.c. Deb.	130—135	−3	3 6 8
1,524,288	,,	,,	3	Do. 3 p.c. Deb.	87—90	..	3 6 8
700,000	50	,,	10	Grand Junction 10 p.c. max.	136—139	..	3 11 11
310,000	Stk.	Mar. 29	4	4 p.c. Deb.	113—118	..	3 7 10
708,000	Stk.	Feb. 25	10	Kent	315—320	..	3 2 6
160,000	,,	,,	7	Do. New, 7 p.c. max.	217—222	..	3 3 0
1,043,800	100	Dec. 30	11	Lambeth, 10 p.c. max.	312—317	..	3 9 5
406,200	100	,,	8½	Do. 7½ p.c. max.	223—233	..	3 13 0
350,000	Stk.	Mar. 29	4	Do. 4 p.c. Deb.	113—118	..	3 7 10
500,000	100	Feb. 25	10	New River, New Shares	360—370	..	2 14 0
1,000,000	Stk.	Jan. 28	4	Do. 4 p.c. Deb.	116—119	..	3 7 3
902,300	Stk.	Dec. 30	7½	South-wark and Vauxhall Ord.	273—278	..	2 14 0
126,500	100	,,	7½	7½ p.c. max.	215—225	..	3 6 8
489,200	Stk.	,,	5	5 p.c. Pref.	144—149	..	3 7 1
1,019,585	,,	Mar. 29	4	4 p.c. A Deb.	113—118	..	3 7 10
1,155,066	Stk.	Dec. 11	10	West Middlesex	293—298	..	3 7 1
200,000	,,	,,	4½	Do. 4½ p.c. Deb.	130—135	..	3 6 8
200,000	,,	Mar. 10	3	Do. 3 p.c. Deb.	88—90	+½	3 6 8

* Ex div.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

SUPERINTENDENT OF DISTRIBUTING DEPARTMENT. No. 4195.
REPRESENTATIVE OF GAS ENGINEERING FIRM. No. 4197.
REPRESENTATIVE OF COAL MERCHANT. No. 4198.
EXHIBITION REPRESENTATIVE AND TRAVELLER GAS STOVE TRADE. No. 4199.
SALESMAN FOR SHOW ROOM. Falmouth Gas Company.
CANVASSERS. Richmond Gas Stove and Meter Company.
GENERAL WORKING FOREMAN. No. 4192.
STOKER. Herne Bay Gas Company.

Situation Wanted.

ASSISTANT-MANAGER. No. 4178.

Plant, &c., for Sale.

CONDENSER (250,000 feet). Redditch Gas-Works.
INCANDESCENT MANTLE FACTORY. No. 4200.
PURIFIERS, &c. Blyth and Cowpen Gas Company.
TABLE ENGINES (two). No. 4196.

Sales of Stocks and Shares.

BRISTOL WATER COMPANY. May 5.
LOWESTOFT WATER AND GAS COMPANY. April 25.
ROMFORD GAS COMPANY. April 25.
SOUTHEND WATER-WORKS COMPANY. April 25.
TOTTENHAM AND EDMONTON GAS COMPANY. April 25.

TENDERS FOR

Benzol.

ALLOA GAS DEPARTMENT. Tenders by April 22.

Coal and Cannel.

BRENTWOOD GAS COMPANY. Tenders by April 29.
DARLINGTON GAS DEPARTMENT. Tenders by April 21.
DENTON GAS DEPARTMENT. Tenders by April 29.
INVERNESS GAS DEPARTMENT. Tenders by April 26.
KIDSGROVE GAS COMPANY. Tenders by April 30.
LOUTH GAS COMPANY. Tenders by April 30.
THAMES VALLEY AND GORING WATER AND GAS COMPANY. Tenders by April 29.
ULVERSTON GAS DEPARTMENT. Tenders by April 28.
WIDNES GAS DEPARTMENT. Tenders by May 3.

Condenser.

CASTLETOWN (ISLE OF MAN) GAS COMPANY.

Exhausters and Engines.

CASTLETOWN (ISLE OF MAN) GAS COMPANY.
PENRITH URBAN DISTRICT COUNCIL. Tenders by April 27.

Gasholders.

ASH-NEXT-SANDWICH GAS COMPANY. Tenders by May 6.
CASTLETOWN (ISLE OF MAN) GAS COMPANY.

Governors, &c.

PENRITH URBAN DISTRICT COUNCIL. Tenders by April 27.

Hydrants.

BARNOLDSWICK URBAN DISTRICT COUNCIL. Tenders by April 27.

Lime.

ALLOA GAS DEPARTMENT. Tenders by April 22.
INVERNESS GAS DEPARTMENT. Tenders by April 26.

Meters.

PENRITH URBAN DISTRICT COUNCIL. Tenders by April 27.
ROTHERHAM GAS DEPARTMENT. Tenders by May 1.

Pipes and Specials, &c.

BARNOLDSWICK URBAN DISTRICT COUNCIL. Tenders by April 27.

Scrubber.

CASTLETOWN (ISLE OF MAN) GAS COMPANY.

Sulphuric Acid.

ALLOA GAS DEPARTMENT. Tenders by April 22.

Tar, Ammoniacal Liquor, &c.

ALLOA GAS DEPARTMENT. Tenders by April 22.
ARBROATH GAS DEPARTMENT. Tenders by May 2.
BROUGHTY FERRY GAS DEPARTMENT. Tenders by April 27.
DENTON GAS DEPARTMENT. Tenders by April 29.
DEVONPORT GAS DEPARTMENT. Tenders by April 30.
DUMFRIES GAS DEPARTMENT. Tenders by April 30.
ULVERSTON GAS DEPARTMENT. Tenders by April 28

Valves, &c.

BARNOLDSWICK URBAN DISTRICT COUNCIL. Tenders by April 27.

Water Gas Plant.

EDINBURGH AND LEITH GAS COMMISSIONERS. Tenders by May 9.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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All Communications, Remittances, &c., to be addressed to
WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE has a larger annual sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

GAS PURIFICATION & CHEMICAL CO., LD.

JOHN WM. O'NEILL, Managing Director,

PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for GAS-WORKS.

ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London E.C. "Volcanism, London."

BROTHERTON & CO., LIMITED.

Offices: Commercial Buildings, LEEDS. Correspondence invited.

SULPHATE OF AMMONIA SATURATORS and LEAD WORK for Sulphate Ammonia Plants.

For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."

Largest Practice and most Up-to-Date Works in Britain.

JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.

BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

JOHN RILEY & SONS, Chemical Manu- facturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,

VICTORIA PAINT WORKS, MANCHESTER.

Telegrams: "ENAMEL." National Telephone 1759.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PATENTS AND TRADE MARKS PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.

MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

GAS TAR wanted.

BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPENT OXIDE.

THE South Metropolitan Gas Company are always open to receive OFFERS of SPENT OXIDE.

Chief Office: 709, Old Kent Road, London, S.E.
Telegrams: "METROGAS, LONDON."

PENNY-IN-THE-SLOT WORK.

H. GREENE & SONS, Ltd., are pre- pared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.

SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.
Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

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THE First Dutch Bog Ore Co., Ltd., (Eerste Hollandsche Yzererts Maaty), ROTTERDAM.

General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.

London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.

General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

COAL GAS TAR wanted.

ROBINSON BROTHERS, LIMITED. Works: WEST BROMWICH, KNOTTINGLEY, and SPONDON.

TO GAS AND WATER OFFICIALS.

MELROSE CYCLES and Slot Copper COLLECTORS. Latest Design and lowest Prices. For Cash or gradual payments. Catalogue free.

MELROSE CYCLE COMPANY, COVENTRY.

ATTERTON'S Patent Charging Machine, especially adapted for Small Works up to 50 Millions. Nearly 40 already supplied, and still supplying. Would soon repay for small outlay. Increased make and reduction in cost.

Apply to E. PADFIELD AND CO., 96 & 98, Leadenhall Street, LONDON, E.C.

APPOINTMENT wanted as Assistant- MANAGER in Gas-Works. Trained at Engineering Works. Recently prepared Drawings and Superintended erection of large up-to-date Gas-Works. Good knowledge of Chemistry and Gas-Works Routine. Honours Gas Manufacture.

Address No. 4178, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

STOKER wanted. Scoop work. Wages 31s. 6d. State Age and Height. Permanent employment to a steady man.

Apply to C. V. BENNETT, Manager, HERNE BAY GAS AND COKE COMPANY, LIMITED.

REPRESENTATIVE wanted for firm of Gas Coal Merchants. Liberal Terms to one with a Good Connection and who knows the Coal Trade.

Apply, by letter, to No. 4198, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

EXHIBITION Representative and Under-Traveller required for Gas-Stove Trade. Good encouragement for suitable man.

Apply, by letter, to No. 4199, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Gentleman to represent a firm of Gas Engineers in the North of England. Must have knowledge of Coal and Coke Elevating and Conveying Plants. Good Salary to a competent man.

Apply, in first instance, to No. 4197, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CANVASSERS, Ten wanted, of good address. Must have had previous Experience. Good Salary and Commission paid.

Apply, by letter only, to the RICHMOND GAS STOVE AND METER COMPANY, LIMITED, 132, Queen Victoria Street, LONDON, E.C.

FALMOUTH GAS COMPANY.

WANTED a Salesman for the Show- Room. Must have held similar appointment and be able to instruct Consumers in the best use of modern Gas Appliances, and willing to make himself generally useful in the Office and Outdoor Department.

Married man whose wife would undertake to keep clean the Office and Show-Room preferred. A House of Three Rooms on the premises free.

Applications, in Candidate's own handwriting, stating Age, Wages required, with full Particulars as to Experience, addressed to the ENGINEER and MANAGER, Gas-Works, FALMOUTH.

OXIDE OF IRON.

(NATURAL.)

BALE & CHURCH will be pleased to send Samples and Quotations, and make Offers for SPENT OXIDE.

BALE'S FIRE CEMENT, PAINT, AND GAS COAL.

5, CROOKED LANE, LONDON, E.C.

COAL GAS TAR wanted.

BEST PRICES GIVEN.

SHARPNESS CHEMICAL COMPANY, LIMITED, Sharpness Docks, GLOS.

SULPHURIC ACID.

SPECIALLY prepared for the Manu- facture of SULPHATE OF AMMONIA.

SPENCER, CHAPMAN, AND MESSEL, LIMITED, 36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.

Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

WANTED, by a Gas Company in the North-West of England, a General WORKING FOREMAN, for a Works making about 55 Millions. Must understand Generator Furnaces, Manufacture of Sulphate of Ammonia, be capable of Taking Charge of the Works in the absence of the Manager, and be a Reliable Man. Total abstainer preferred. Salary £90 a year.

Apply, by letter, stating Age, Experience, and enclosing three Testimonials, to No. 4192, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SUPERINTENDENT OF DISTRIBUTION DEPARTMENT.

AN Important Suburban Gas Company intend appointing a thoroughly competent SUPERINTENDENT of their Distribution Department. He must be technically qualified for such a position, be a good organizer, and capable of reporting to, and carrying out the requirements of, the Engineer.

Salary £250 per annum.

Applications—giving full Particulars as to Experience, to No. 4195, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.—will be treated in confidence.

TO BE SOLD—New Single Gasholder, 50 feet diameter by 15 feet deep, with Six Wrought-Iron Standards, top Ties, and Suspension Gear if needed. Ready for erection.

Write J. WRIGHT, 181, Queen Victoria Street, LONDON, E.C.

FOR SALE—A well-equipped, and in good working order, INCANDESCENT MANTLE FACTORY, situated S.W. Will accept £500 inclusive. Fortune to an enterprising firm.

Apply, by letter, to No. 4200, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

PURIFIERS.

THE Blyth and Cowpen Gas Company have FOR DISPOSAL a set of Four PURIFIERS, each 10 feet square, with 10-inch Connections, Dry Faced Centre and Check Valves, Girders, and Lifting Gear for same. Erected by R. Dempster and Sons, Elland.

Offers to A. C. FAWCETT, Secretary to the Company, Blyth, NORTHUMBERLAND.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE—GASHOLDER AND TANK.

SPECIAL opportunity for the purchase of GASHOLDER, 40,000 feet capacity, in strong CAST-IRON TANK. Will be refixed cheap to an immediate customer; prompt removal being essential. Full Particulars on application.

J. FIRTH BLAKELEY AND CO., Gas Engineers, Thornhill, DEWSBURY.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

CONDENSER for Sale. In splendid Condition. Cheap. Capacity 250,000 Cubic Feet per Twenty-four hours.
Apply to A. E. LAYTON, Manager, Gas-Works, REDDITCH.

TWO Second-Hand Table Engines, in Splendid Condition, FOR SALE, to make room for larger. Fluted Columns and taper guide blocks. Size of Cylinder, 6½-inch and 7-inch diameter by 12-inch Stroke. May be seen at works by appointment.
Offers to be sent to No. 4196, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CONTRACT FOR COAL AND SHELL LIME.

THE Inverness Gas Commissioners are prepared to receive OFFERS for 8500 Tons of GAS COAL, to be delivered Free at Inverness over a period of Six or Twelve Months, at the option of the Commissioners; also 300 Tons of SHELL LIME, to be delivered Free at Inverness.
Tender Forms may be had by applying to the Manager at the Gas-Works.
Tenders, endorsed and addressed to Kenneth Macdonald, Esq., Clerk to the Commissioners, will be received up to Tuesday, the 26th curt.

Gas-Works, Inverness, April 15, 1904.

ASH-NEXT-SANDWICH GAS COMPANY.

TENDERS are invited for the supply and erection of a GASHOLDER, capacity about 15,000 Cubic Feet.
Plans and Specifications may be seen at the Office of the undersigned.
Tenders to be sent in not later than May 6 addressed to me at my Office.
The Directors do not bind themselves to accept the lowest or any Tender.

FRANK HIGGINSON, Assoc.M.Inst.M.E.,
Engineer.

Gas Office, Alexandra Road,
Broadstairs, Kent.

DENTON URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

TAR.

THE Gas Committee invite Tenders for TAR; the same to be sent in on or before the 29th of April inst.
Particulars may be obtained from the Gas Engineer, Mr. J. Chadwick Smith, Gas-Works, Denton, near Manchester.
The Committee do not bind themselves to accept the highest or any Tender.

By order,
WILLIAM RICHARDS,
Clerk of the Council.

April 13, 1904.

DENTON URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

COAL.

THE Gas Committee invite Tenders for the supply of COAL; the same to be sent in on or before the 29th of April inst.
Specification and Form of Tender to be obtained from the Gas Engineer, Mr. J. Chadwick Smith, Gas-Works, Denton, near Manchester.
The Committee do not bind themselves to accept the lowest or any Tender.

By order,
WILLIAM RICHARDS,
Clerk of the Council.

April 13, 1904.

ULVERSTON URBAN DISTRICT COUNCIL.

TO TAR DISTILLERS.

THE Gas and Water Committee are prepared to receive TENDERS for the purchase of the Surplus TAR produced at their Gas-Works during the Year commencing July 1 next.
Further Information and Forms of Tender may be had on application to the undersigned.
Sealed Tenders, endorsed "Tender for Tar," and addressed to the Chairman of the Gas and Water Committee, to be sent in not later than the 28th inst.
The Committee do not bind themselves to accept the highest or any Tender.

JNO. SWAN.
Engineer and Manager.

ULVERSTON URBAN DISTRICT COUNCIL.

TENDERS FOR COAL AND CANNEL.

THE Gas and Water Committee are prepared to receive TENDERS for the supply of best screened GAS COAL and CANNEL for a period of One, Two, or Three Years commencing July 1 next.
Parties tendering must give full Particulars of the Coal or Cannel they propose to supply, and name the pit from which the same will be raised.
Further Information and Forms of Tender may be obtained on application to the undersigned.
Sealed Tenders, endorsed "Tender for Coal" or "Cannel," addressed to the Chairman of the Gas and Water Committee, to be sent in not later than the 28th inst.
The Committee do not bind themselves to accept the lowest or any Tender.

JNO. SWAN,
Engineer and Manager.

COUNTY BOROUGH OF ROTHERHAM.
(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive TENDERS for the supply and delivery of Ordinary and Automatic DRY METERS as may be required during the ensuing Twelve Months.
Further Particulars may be had on application to the Engineer and Manager, at the Gas Offices.
Tenders to be addressed to the undersigned, and to be received not later than May 2 next.

H. HAMPTON COPNALL,
Town Clerk.

TAR.

OFFERS wanted by the Arbroath Gas Corporation for refined COAL TAR as produced at their Gas-Works from the 1st of June, 1904, to the 1st of June, 1905, in Contractor's Tank Waggon on Rail at Arbroath, or in Contractor's Casks at Arbroath Harbour. Total quantity about 70,000 to 80,000 Gallons for the Year.
Offers to be sealed and marked on envelope "Offers for Tar," and delivered to Mr. ALEX. C. YOUNG, Gas Manager, ARBROATH, N.B., not later than Ten a.m. on Monday, the 2nd prox.

THE Widnes Corporation are prepared to receive TENDERS for the supply of about 30,000 Tons of GAS COAL (Slack, "Through and Through," or Screened Coal) for the Year ending June 30, 1905, to be delivered at the Gas-Works, Widnes.
Conditions and Forms of Tender may be obtained from Mr. Isaac Carr, M.Inst.C.E., Gas Engineer, Widnes.
Tenders, endorsed "Gas Coal," to be delivered to the undersigned not later than noon of Tuesday, the 3rd prox.
The Corporation do not bind themselves to accept the lowest or any Tender.

H. S. OPPENHEIM,
Town Clerk.

Town Hall, Widnes,
April 15, 1904.

ALLOA TOWN COUNCIL.
(GAS DEPARTMENT.)

THE Gas Committee of the Alloa Town Council desires OFFERS for the supply of the following Requirements for the Year ending the 5th of May, 1905:—

LIME for Purifying Purposes.
SULPHURIC ACID.
90 per cent. BENZOL.

Also OFFERS for the TAR produced at their Works for the Year ending the 15th of May, 1905.
Sealed Offers, endorsed "Tender for Lime," &c., to be sent to F. G. Ewing, Esq., Town Clerk, Alloa, on or before Friday, the 22nd day of April.
Further Particulars from the undersigned.

J. W. NAPIER,
Engineer and Manager.

LOUTH GASLIGHT COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the Louth Gaslight Company invite TENDERS for the supply of 4000 Tons (more or less) of GAS COAL required at their Works during a period of One Year.
Forms of Tender, with Specification, may be obtained on application to the undersigned.
Sealed Tenders, endorsed "Tenders for Coal," addressed to the Chairman of the Directors, Louth Gaslight Company, Louth, to be sent to the undersigned on or before April 30, 1904.
The Directors do not bind themselves to accept the lowest or any Tender.

PHILIP ALLISON,
Secretary.

April 12, 1904.

DEVONPORT CORPORATION.
(GAS DEPARTMENT.)

THE Gas Committee of the Devonport Corporation are prepared to receive TENDERS for the purchase of the surplus GAS TAR produced at their Gas-Works during the Year ending the 31st day of March, 1905.
Probable quantity about 1700 tons.
The Tar will be loaded into Contractors' tank carts at the Gas-Works.
Sealed Tenders, endorsed "Tender for Tar," to be delivered to R. J. Fittall, jun., Town Clerk, Devonport, on or before the 30th of April, 1904.

SIDNEY E. STEVENSON,
Engineer and Manager.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

GRANTON WORKS.
CONTRACT No. 9.
GAS PLANT AND APPLIANCES.

THE Commissioners are prepared to receive TENDERS for the supply, delivery, and erection of supplementary Plant and Appliances for CARBURETTED WATER-GAS INSTALLATION at the Granton Gas-Works.
Specifications, Schedule of quantities, and Form of Tender may be obtained on application to Mr. W. R. Herring, M.Inst.C.E., Chief Engineer and Manager, on receipt of a crossed cheque for £3 3s., which will be returned when a *bonâ-fide* Tender is received.
The Drawings may be inspected by appointment, and further Information obtained upon application to the Engineer, New Street Works, Edinburgh.
Sealed Tenders must be addressed and delivered to the undersigned on or before Ten a.m., the 9th day of May, 1904.

JAMES M'G. JACK,
Clerk.

25, Waterloo Place, Edinburgh,
April 15, 1904.

TAR Contracts Wanted on the Sliding-Scale or at Fixed Prices.
Managers and Secretaries desirous of selling to best advantage please communicate with DENT AND CO., Ouse Chemical Works, SELBY.

BROUGHTY FERRY TOWN COUNCIL.

TO TAR DISTILLERS.

THE Gas Committee are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Gas-Works during the Year commencing the 16th of May next.
Further Information may be had on application to the undersigned.
Sealed Tenders, endorsed "Tender for Tar," and addressed to the Manager, to be sent in not later than the 27th inst.
The Committee do not bind themselves to accept the highest or any Tender.

GEO. KEILLOR.
Engineer and Manager.

STEAM COAL.

THE Directors of the Thames Valley and Goring Water and Gas Company, Limited, invite TENDERS for supplying best smokeless STEAM COALS to Goring-on-Thames Railway Station (Great Western Railway).
Tenders may be sent in covering One, Two, or Three Years' supply for their Goring and Cleve Pumping-Stations.
The Directors do not bind themselves to accept the lowest or any Tender.
Tenders, endorsed "Steam Coal," to be addressed to the Chairman, Thames Valley and Goring Water and Gas Company, Limited, 20, Bucklersbury, London, E.C., and delivered not later than Ten a.m. on April 29, 1904.

J. HUNT,
Secretary.

Goring-on-Thames, Oxon,
April 15, 1904.

CORPORATION OF DARLINGTON.
(GAS-WORKS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas-Works Committee of the above Corporation invite TENDERS for the supply of 35,000 Tons of freshly wrought GAS COAL, delivered at the Gas-Works Siding as required during the ensuing Twelve Months.
Further Particulars and Form of Tender may be obtained from Mr. Frank P. Tarratt, Gas-Works Engineer, Darlington.
Tenders, endorsed "Tender for Gas Coal," to be delivered at my Office, Houndgate, Darlington, not later than April 21, 1904.
No pledge is given that the lowest or any Tender will be accepted.

(Signed) H. G STEAVENSON,
Town Clerk.

Town Clerk's Office, Darlington,
April 13, 1904.

PENRITH URBAN DISTRICT COUNCIL.

THE Gas and Water Committee of the above Council invite TENDERS for the supply and erection of the following Apparatus—viz:

No. 1 CONTRACT.

Two Three-Blade, 10,000 cubic feet per hour, ROTARY EXHAUSTERS and ENGINES combined, with all Valves, Connections, Bye-Pass, Governor, &c.

No. 2 CONTRACT.

Square STATION METER, 20,000 cubic feet per hour, with 12-inch Hydraulic Valves and Connections.

No. 3 CONTRACT.

One or two STATION GOVERNORS.
One SAFETY GOVERNOR, Valves, Connections, &c.

Full Particulars of Contract No. 3, with print showing proposed arrangement and any other Particulars, may be obtained from the undersigned.
The Committee do not bind themselves to accept any Tender.
Sealed Tenders, endorsed "Tender No. 1, 2, or 3," and addressed to the Chairman of the Gas and Water Committee, must be delivered at the Public Offices, Penrith, not later than noon on Wednesday, April 27, 1904.

E. SHAUL,
Manager.

Gas-Works, Penrith, April 16, 1904.

BARNOLDSWICK URBAN DISTRICT COUNCIL.
(GAS AND WATER DEPARTMENT.)

THE Gas and Water Committee invite TENDERS for the supply of:—

CONTRACT No. 2.—PIPES.

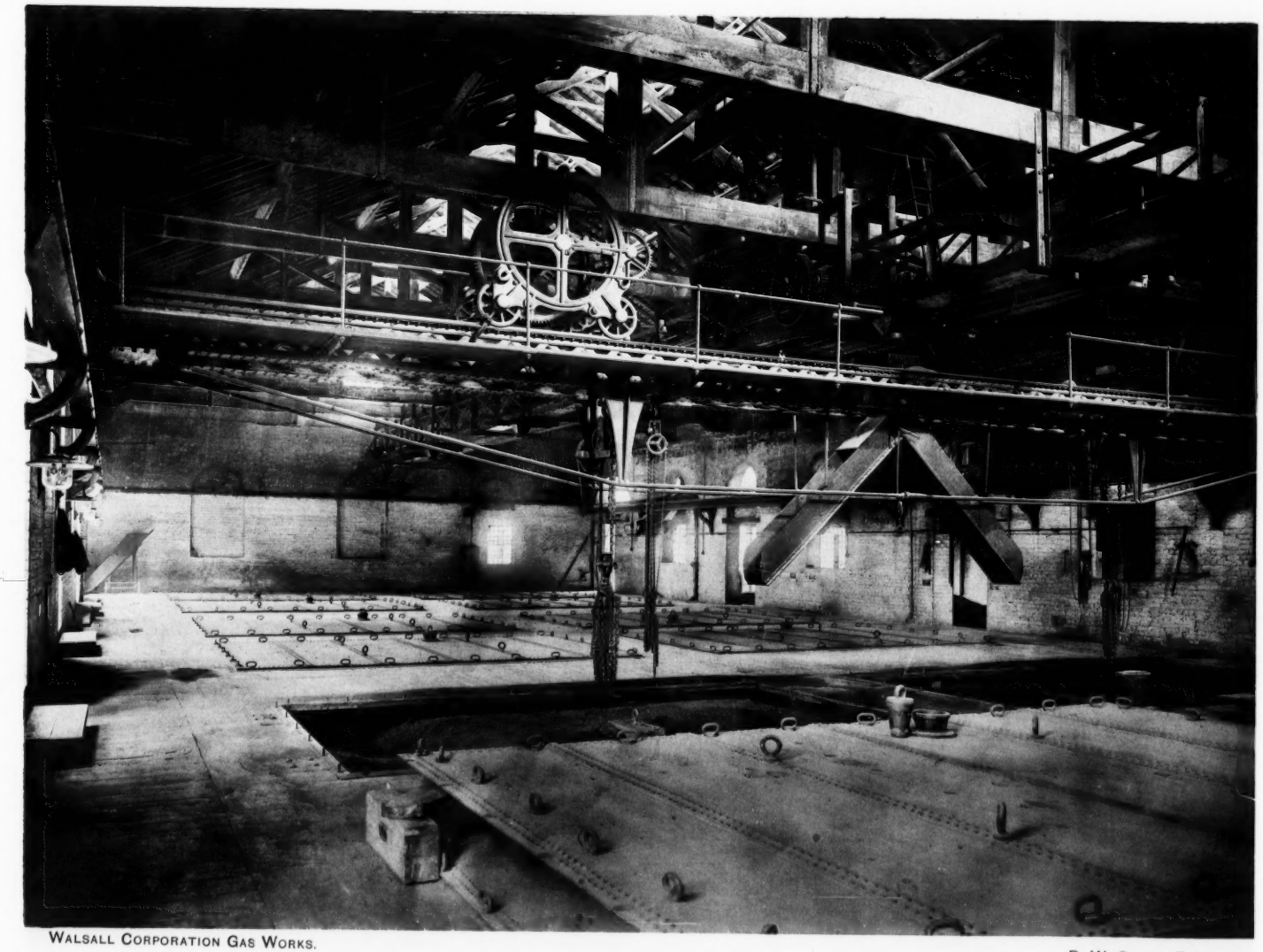
1672 yds. of 8-inch Spigot and Socket Cast-Iron WATER-PIPES.
250 yds. of 6-inch Spigot and Socket Cast-Iron WATER-PIPES.
5 Tons of SPECIALS.
Total approximate weight of 8-inch Pipes, 102 tons.
" " " 6 " " 12 "

CONTRACT No. 3.—VALVES.

Six 8-inch SLUICE VALVES.
Two 6-inch " "
One Double AIR-VALVE.
One Single " "
Thirteen 3-inch BALL HYDRANTS.

Specifications, Bills of Quantities, and Forms of Tender may be obtained on application to the undersigned.
Sealed Tenders, on Forms embodied in the Specifications, endorsed "Contract No. 2—Pipes," "Contract No. 3—Valves," addressed to the Chairman Gas Committee, Town Hall, Barnoldswick, to be delivered not later than the 27th of April, 1904.

J. W. THOMPSON,
Gas and Water Manager.



Walsall Corporation Gas Works. B. W. Smith, Engineer.

8—48′-0″ × 18′-0″ PURIFIERS, LIFTING APPARATUS, AND OXIDE CONVEYING MACHINERY,

MADE AND ERECTED IN 1901, BY

ROBERT DEMPSTER & SONS LTD., ELLAND, YORKS.

Printed for Walter King, by King, Sell & Olding, Ltd.; and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, April 19th, 1904.

Collotype by Waterlow & Sons Ltd.

KIDSGROVE GASLIGHT COMPANY.

TENDERS are invited for the supply of about 4000 Tons of GAS COAL to be delivered at these Works during the Twelve Months ending June 30, 1905.

Sealed Tenders, on Contractor's own Form, to be addressed to the Chairman, and delivered to me not later than April 30.

JAMES BEECH,
Manager and Secretary.

Gas-Works, Kidsgrove.

THE Directors of The Castletown (Isle of Man) Gaslight Company, Limited, are prepared to receive TENDERS for the supply and erection of a GAS EXHAUSTER and ENGINE, CONDENSER, TOWER SCRUBBER, and GASHOLDER.

Particulars may be obtained from the Engineers, Messrs. Thomas Newbigging and Son, 5, Norfolk Street, Manchester.

J. J. STOWELL,
Secretary.

Castletown, Isle of Man,
April, 1904.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NEW ISSUE OF £12,500 ADDITIONAL "B" CONSOLIDATED STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Monday, April 25, at Two o'clock precisely, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

LOWESTOFT WATER AND GAS COMPANY.

SALE BY AUCTION OF 400 ADDITIONAL ORDINARY £10 SHARES,

Ranking for 7 per cent.; the dividend on similar Shares in the Company having been 5¼ per cent. for several Years past; also

£1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, London, E.C., on Monday, April 25, at Two o'clock, in Lots, by Order of the Directors.

The Company, incorporated in 1853, supply Water and Gas in Lowestoft and the surrounding District. The Water-Rental in 1891 was £7146, in 1903 it was £15,122; and the Gas consumption has advanced from 43 million cubic feet in 1891 to nearly 77 millions in 1903.

New Works to keep pace with the increasing demand for Water and Gas are necessary; and it is for these Works that the new Capital is being raised.

Particulars of Sale, and Form of Instructions for the Auctioneer or Secretary to purchase for Investors unable to attend the Auction, obtainable, post free, of the SECRETARY of the Company, 137, London Road, LOWESTOFT, and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

GAS AND WATER ORDINARY SHARES
IN THE
SOUTHEND WATER-WORKS COMPANY, AND ROMFORD GAS AND COKE COMPANY, LTD.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Monday, April 25, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

BRISTOL WATER-WORKS COMPANY.

SALE OF ORDINARY STOCK.

MESSRS. ALEXANDER, DANIEL, AND CO. will SELL BY AUCTION, at the Bank Auction Mart, Corn Street, Bristol, on Thursday, the 5th of May, 1904, at Three o'clock in the Afternoon,

£15,000

BRISTOL WATER-WORKS 7 PER CENT. MAXIMUM CONSOLIDATED ORDINARY STOCK in Lots of £100,

At the reserved price of £147 for every £100 Stock.

The above £15,000 Stock is part of the 7 per cent. Maximum Consolidated Ordinary Stock, amounting to £690,000, created under the powers of the Bristol Water-Works Acts, 1888, 1889, and 1895.

The Dividend is subject to proportionate diminution whenever the Maximum Dividend to which each class of Ordinary Shares or Ordinary Stock of the Company is entitled shall not be paid in full; but such diminution may be made up in subsequent years.

For further Particulars and Conditions of Sale apply to the AUCTIONEERS, Bank Chambers, Corn Street, BRISTOL; to Messrs. EDWARD GERRISH AND CO., Lloyds Bank Buildings, Corn Street, BRISTOL; or to

ALFRED J. ALEXANDER,
Secretary and General Manager.

Bristol Water-Works Office,
Telephone Avenue, Bristol.

TAR AND LIQUOR CONTRACT.

THE Dumfries Gas Commissioners in- vite OFFERS for the purchase of all surplus TAR (probable quantity 102,000 gallons) and LIQUOR (probable quantity 356,000 gallons) produced at their Works for One Year between the 15th of May, 1904, and the 15th of May, 1905.

Endorsed Tenders, quoting price per 100 gallons for the Tar, and price per 100 gallons for 5° Twaddell Liquor, loaded into purchaser's own Tank-Waggons at the Gas-Works, to be sent to John Grierson, Esq., Town Clerk, on or before the 30th of April, 1904.

The highest or any Tender may not be accepted.

Gas-Works, Dumfries,
April 13, 1904.

TENDERS FOR GAS COAL.

THE Brentwood Gas, Coke, and Light Company, Limited, are prepared to receive TENDERS for the supply of 6500 Tons of good, clean, fresh-worked GAS COAL, screened and uncreened, for the Year ending April 30, 1905.

Deliveries to be free to Brentwood Station (G.E.R.), in trucks with a door at one end, in quantities to be subsequently determined.

Not less than 2000 Tons of any one description of Coal will be taken.

No Form of Tender issued.

Tenders to be delivered to the undersigned on or before Friday, April 29, 1904.

The lowest or any Tender not necessarily accepted.

C. A. FIELDER,
Secretary.

Brentwood, Essex,
April 8, 1904.

A 4pp. 8vo. Leaflet. Price, 10s. 6d. per 100.

"Agricultural Value of Gas Lime."

A Paper read by Mr. CHARLES D. PHILLIPS, J.P., a Director of the Newport Gas Company, before the Monmouthshire Chamber of Agriculture.

Reprinted from the "JOURNAL" for Oct. 13, 1903.

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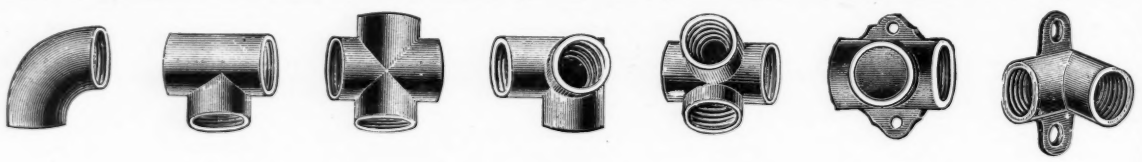

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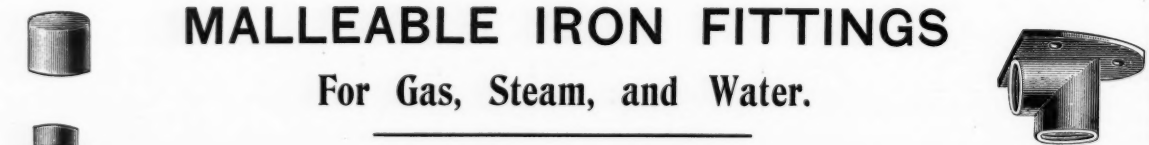

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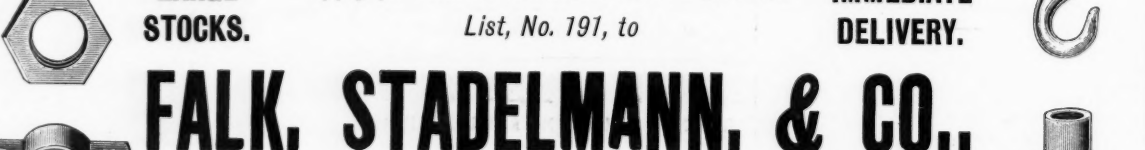

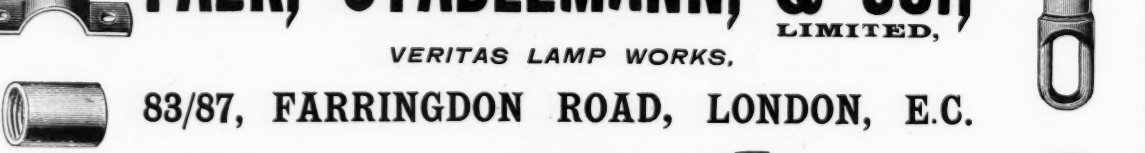

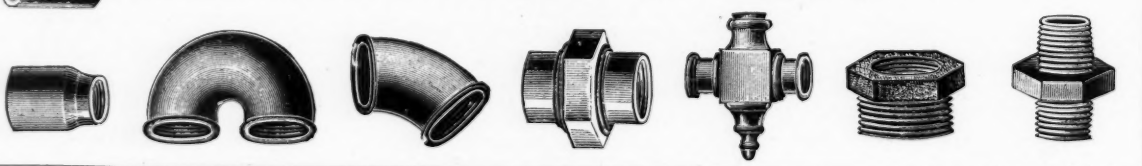

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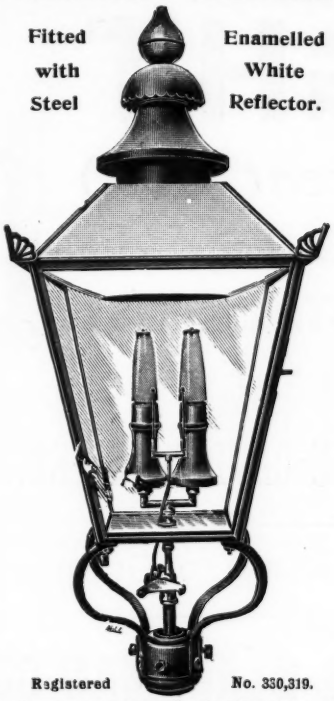

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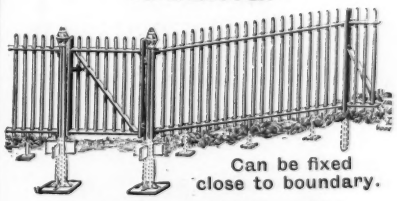

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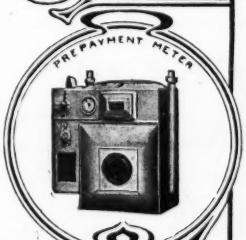

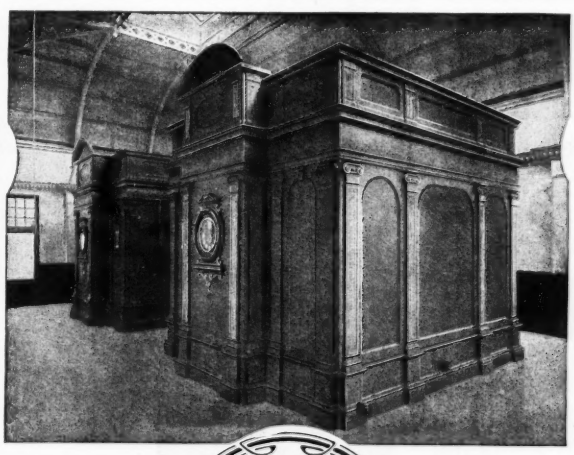

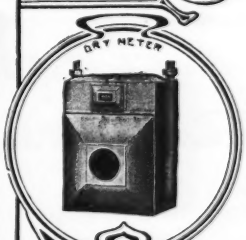

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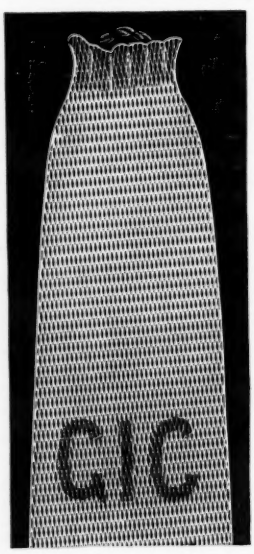

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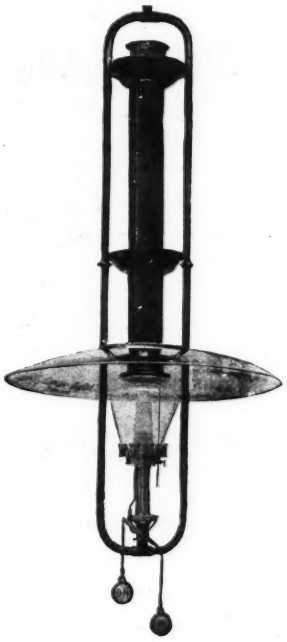

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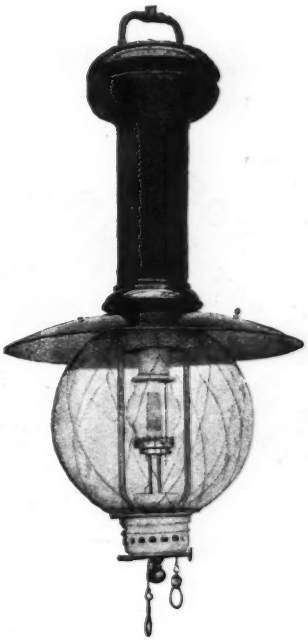

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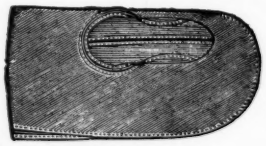

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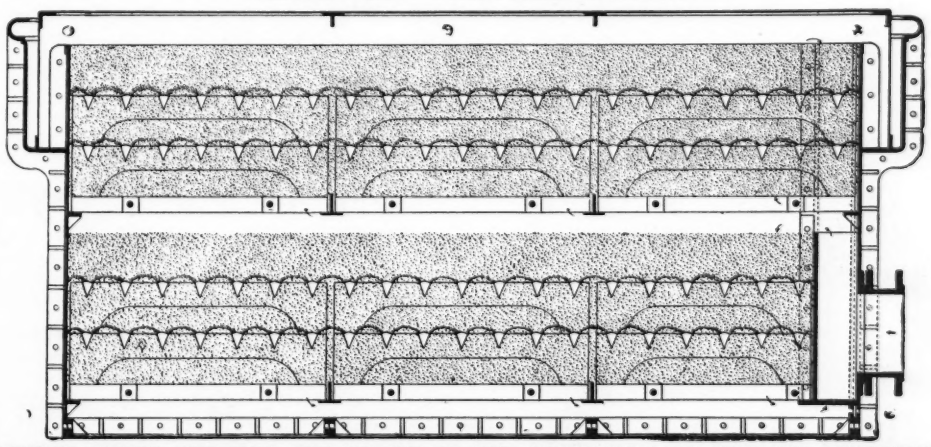

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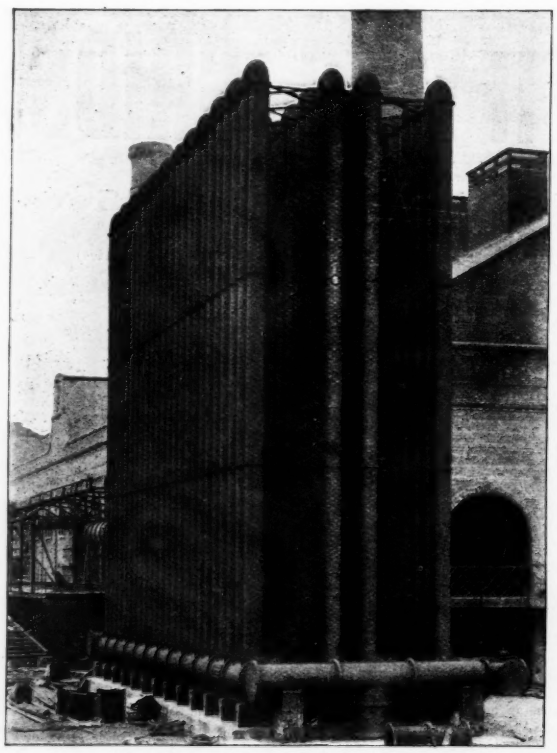

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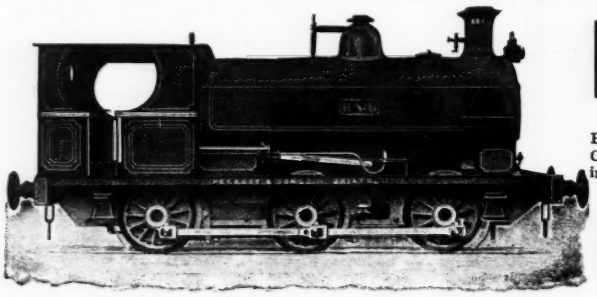

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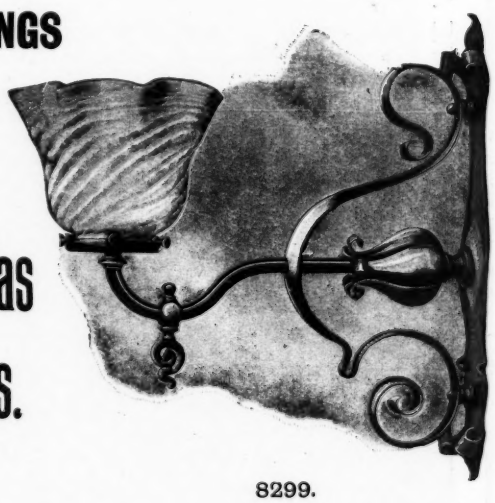

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